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American Fern Journal

A QUARTERLY DEVOTED TO FERNS

Published by the

AMERICAN FERN SOCIETY

EDITORS

R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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American Fern Journal

Vol. 15 JANUARY–MARCH, 1925 No. 1

Some Fern Finds in Virginia

Edgar T. Wherry

Botrychium obliquum var. tenuifolium.—In August, 1924, several visits were made to Lanexa, New Kent County, Virginia (between Richmond and Williamsburg), for the purpose of verifying the existence there of *Habenaria repens*, reported by the late Professor Grimes. This orchid was not found, and there is a possibility that an abnormal plant of *H. clavellata* or *H. lacera* was mistaken for it; but the discovery of other interesting plants made the trips worth while. In the swamp along the Chickahominy River 0.7 kilometer south-southwest of the railroad station a small colony of a peculiar Grapefern[1] was noted. It differs from typical *Botrychium obliquum*, which also grows there, in its sterile segment having only 9 to 12 divisions, with more or less cuneate bases, and in the fertile segment being once-pinnate, or at most twice-pinnate at the base, and very slender-stemmed. Another distinction consists in the length of the common stalk of the two segments, which in *B. obliquum* is rarely more than 2 centimeters long, but here is 4 to 5 cm., or about one fourth the total

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[Volume 14, No. 4 of the Journal, pages 99–130, plates 7 and 8, was issued January 6, 1925.]

[1] The spellings and arrangements of common names are those of Standardized Plant Names, Salem, 1923, except where noted.

height of the plant. It evidently approaches the southern *B. obliquum* var. *tenuifolium* (Underwood) Gilbert,[2] and justifies the inclusion of this variety in lists of ferns of the northeastern states.[3]

The habitat is a dense swampy woods, with Pond Pine (*Pinus serotina*), Baldcypress (*Taxodium distichum*), Tupelo (*Nyssa* sp.), and much Greenbrier (*Smilax* sp.)[4] The Grapeferns grow in damp peaty depressions, just low enough to be affected slightly by the tide in the river. Their soil reaction is subacid to mediacid, specific acidity 50 to 150. No consistent differences in reaction or shading could be detected between the typical species and the variety, although the latter occurs in somewhat moister places.

PELLAEA GLABELLA.—The discovery of this fern in the southwestern part of Virginia in 1923 has been announced by Rev. Fred. W. Gray.[5] In late August, 1924, it turned up in an entirely different region, namely along Hawksbill Creek, three kilometers north of Luray, Page County, or about 250 km. northeast of the other locality, a further extension of its previously known range. The colony is a very small one, not more than 10 plants being in evidence, and most of these being much stunted. It is on the north face of a small limestone cliff, standing

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[2] Nomenclature of Gray's Manual, 7th edition.

[3] There has, heretofore, been some question as to whether it should be so included, as the only northeastern material preserved was very near to *B. obliquum*; and it was omitted from the recent list of Tilton, Fern-lovers' Companion, 1922. The present material, together with a collection made by Grimes, near Williamsburg, No. 3113, at any rate seems distinct enough to receive some nomenclatorial recognition.

[4] There is less Greenbrier now than there was before my visits.

[5] This journal, 14: 124. 1924.

out on the east bank of the creek, near a cave opening around which the rock forms a sort of arch. The soil reaction is as usual for this species minimalkaline, specific alkalinity 5. The Purple Cliffbrake grows on the same rock-face, but the two can be readily distinguished even at a distance by the bluer color and more compact habit of the Smooth Cliffbrake.

CHEILANTHES TOMENTOSA.—In the article on the soil preferences of rock ferns[6] this was placed in subacid and minimacid reaction-classes on the basis of tests of soil around the roots of herbarium specimens only. It has since been tested in the field, in late May, 1923, in the railroad cut east of Natural Bridge Station, C. & O. Railroad. While the rock there is limestone (which normally gives rise to more or less alkalinity) the fern grows in gravel on such steep slopes that the rain has had a chance to leach out free lime, and the soil reaction is neutral. The same is true of *C. lanosa*, which also occurs there. Therefore, while both of these ferns seemingly prefer slightly acid soils, they can evidently tolerate neutral conditions, although their failure to grow here on the bare rock ledges indicates the unfavorable effect upon them of actual alkalinity.

POLYPODIUM VIRGINIANUM forma DELTOIDEUM.—Plants of the Rock-cap Fern[7] with deltoid fronds having basal

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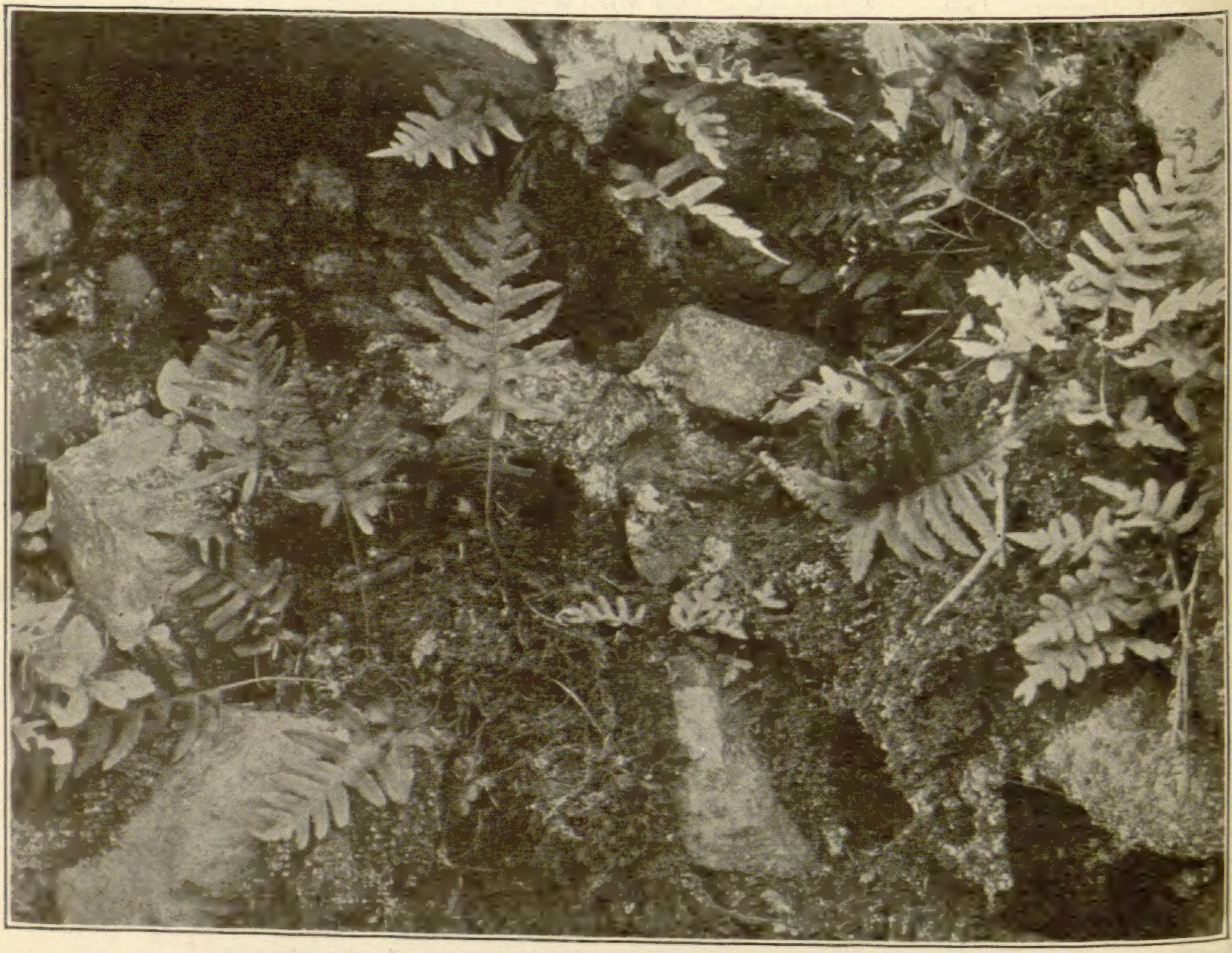
[6] This journal, 10: 17. 1920.

[7] The common name usually given for the east-American representative of *Polypodium vulgare, P. virginianum,* is "Common Polypody"; but the term "polypody" is merely a modification of the technical name, and not in common use except by people who already know this technical name. This plant is known to the more observant natives of the Appalachian Mountains as the Rock-cap Fern, which is so appropriate a term that its introduction into general use seems desirable.



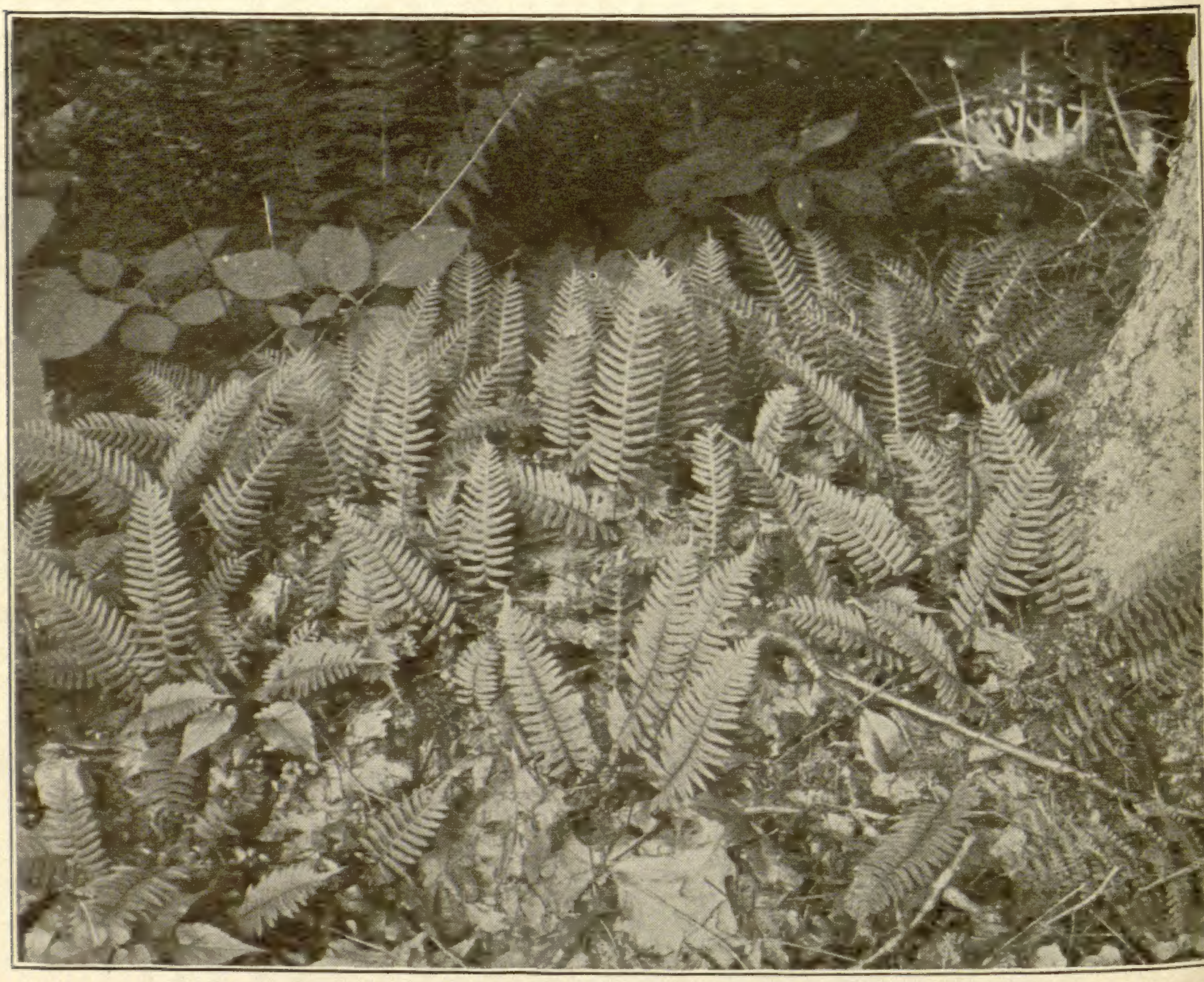
Polypodium virginianum, forma deltoideum,
Bath County, Virginia

spurs were observed in mid-August, 1924, on sandstone ledges around a small spring in open woods on the east side of the road to Bolar, 11 kilometers north-northwest of Warm Springs, Bath County. There were all gradations from the peculiarly shaped fronds to normal ones, and both extremes were often definitely attached to the same rootstocks (plate 1). The soil reaction proved to be subacid, specific acidity 50, a value characteriste of many occurrences of the species.

POLYPODIUM VIRGINIANUM forma ACUMINATUM.—A colony of the Rock-cap Fern with unusually large fronds having markedly acuminate segments was found on a sandstone boulder in a Hemlock-Rhododendron woods on the east side of the road, 3 km. north-northeast of the preceding locality. All of the hundred or more fronds on the clump were alike (plate 2), although adjacent boulders were covered by plants with normal fronds. The soil reaction is low subacid, specific acidity 10–20.

While both of the above variants of *Polypodium virginianum* may be forms, in the technical sense in which that term is used by modern taxonomists, the writer here ventures to suggest that their relationship to the typical species is sufficiently different to justify some sort of nomenclatorial recognition. The "deltoideum" outline is an individual-frond variation, which, in the writer's experience at least, occurs more or less throughout the range of the species. On the other hand, the "acuminatum" type is an individual-plant variation, and has apparently been observed only in northern and high altitude localities. Just how this recognition shall be made may be left for specialists in taxonomy to decide.

THELYPTERIS SIMULATA.—The southernmost locality at which this fern has been reported heretofore appears to



Polypodium virginianum, forma acuminatum,
Bath County, Virginia

be Suitland, Maryland, just east of the District of Columbia. In the course of the trip to Lanexa, Virginia, described above under *Botrychium*, a small colony of it was found in the dense swamp about 0.6 kilometer south-southwest of the station. The soil, which is damp and peaty, proved to be low mediacid in reaction, specific acidity 100, as usual for the species. This extends its known range southward some 175 kilometers.

ASPLENIUM EBENOIDES.—Two plants of this hybrid were noted in late August, 1924, one on the southeast bank of the Shenandoah River one kilometer southwest of Overall Station, the other 2 km. further southwest, along Dry Run near Compton Station, both in Page County, in the Shenandoah Valley. The former plant was photographed but not disturbed; the latter, being in a precarious situation, at the edge of a chicken yard surrounded by luxuriant weeds, was transplanted to the writer's garden. The rock in both cases was limestone, and the soil reaction minimalkaline, specific alkalinity 5 to 8.

ASPLENIUM BRADLEYI.—Because of the rarity of this species, as well as the conflicting statements in the literature as to its soil preferences, new localities for it are always worth reporting. In May, 1924, during an excursion of Wild Flower Preservation Society members from Washington, D. C., to Point of Rocks, on the Potomac River, a single plant of unmistakable *A. bradleyi* was found on quartzite ledges, on the north face of cliffs along Furnace Mountain, Loudoun County, Virginia. Its soil reaction proved to be low mediacid, specific acidity 100, as usual for the species in the writer's experience.

WASHINGTON, D. C.

Main Lines of Evolution in Equisetum[1]—I

JOHN H. SCHAFFNER

In general, evolution may manifest itself in two ways in a group of plants. There may be progressive changes which lead up to a higher level and there may also be segregative changes giving rise to characters which are simply different in kind. By the development of segregative characters new groups or branches arise which may go through a series of progressive changes or steps paralleling more or less closely those which are appearing in the original group. In classification, therefore, it becomes important to recognize what is a low type from what is a high type of plant as well as what characters are persistent in the given group and, therefore, of phylogenetic value.

The easiest way to decide on the relative positions of two plants is to look past the characters they may possess to the hereditary properties that produce these characters. For it is often true that an apparently simpler organ or organ complex represents the activity of a much more complex heredity than a more complicated organography which may merely represent repetition. Low types have fewer, more generalized, functional activities and high types have more specialized, complex, functional activities. Besides looking into the characters and the heredity of the plants under consideration themselves, a comparison must also be made with plants admittedly higher in the scale and with those lower.

Applying these principles to the living species of Equiseta gives an arrangement nearly opposite to that which has been in vogue for a long time, and shows that

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[1] Papers from the Department of Botany, The Ohio State University, No. 151.

in the old arrangement still in our manuals the supposed evolutionary series is upside down.

Although undoubted fossil Equiseta occur rather far back in the geological scale, the evidence to be obtained from this source is still too imperfect to be of much assistance in forming a picture of the true nature of the ancestors of the present-day species. But taking the paleobotanical evidence together with what may be seen in the surviving species and related classes, one can set up an imaginary hypothetical ancestry which is probably not very far from the fact. The present genus leads back to a perennial plant with secondary increase in stem thickness and with ordinary sporadic, monopodial branching. Sooner or later the stem was differentiated into aerial shoot and rhizome, the growing bud evolving the property of dimorphic response to gravity, some buds growing up and some staying under ground. At the same time or later, internodes and whorled, reduced leaves came from the more primitive spiral condition without internodes. Also two types of determinate shoots (one determinate in the sporophyll-bearing axis, the other in the aerial, vegetative axis), hollow, aerial stems, leaf sheaths with minute teeth, and whorled branches appeared. The floral development in the living species is of the most primitive type, the cones developing singly at the ends of vegetative branches, never being collected into inflorescences as in some of the higher species of Lycopodium. It will be seen, therefore, that Equisetum is a primitive type with a highly specialized organography.

The perennial rhizome is fairly uniform in character in all the living species, differing only in such details as thickening of special internodes, and the like. The lowest type of aerial shoot is large, green, and long-lived,

with whorles of branches and is definitely specialized into sterile and fertile systems with the possibility, as in all other horsetails, of occasional intermediate or semi-sterile shoots. The two kinds of shoots are essentially alike except in the presence and absence of cones, which are abundantly produced at the tips and on the branches. The immediate forerunner of the present species probably had rather long, ampliated, green sheaths with persistent teeth although these characters are not necessarily retained in the lowest present-day species. The cone axis stops growing very gradually, giving rise to a prominent point at the tip. The stomata are in bands of several straight rows or scattered in the bands. *Equisetum xylochaetum* Mett., *E. pyramidale* Goldm., and *E. giganteum* L. are of this type and are the typical members of the *Equiseta primitiva.* The *Equiseta primitiva* have the sheath teeth more or less tardily deciduous. As stated, the original condition was probably a sheath with persistent teeth. If so, our lowest living horsetails have changed in this respect, although their teeth are much more tardily deciduous than those of *Equisetum praealtum* or *E. hiemale.*

Milde[2] established five species which if valid properly belong in this group of *Equiseta primitiva*; *E. xylochaetum*, *E. martii* Milde, *E. pyramidale*, *E. giganteum*, and *E. schaffneri* Milde. Baker[3] reduced these species to two—*E. giganteum* and *E. xylochaetum*—and also included *E. myriochaetum* as a synonym of *E. giganteum.* The writer has up to the present time not been able to study enough proper material of these forms to come to any definite conclusions in the matter, except that there appear to be at least three good species, as species go in

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[2] Milde, J. Monographia Equisetorum. 1867.

[3] Baker, J. G. Handbook of the Fern-Allies. 1887.

Equisetum, namely, *E. xylochaetum*, *E. giganteum*, and *E. myriochaetum*. Whatever the true status of the other three species may be, will not affect our notions of the evolutionary relationships of the higher species, as outlined in this paper, since fortunately all occur in the same general, distributional region—tropical and subtropical America.

One line of evolution passed on from the first group through *E. myriochaetum* Schlecht. and Cham., which has the stomata reduced to single rows, over to *E. ramosissimum* Desf., *E. debile* Roxb., and *E. laevigatum* A. Br., which three latter species are the lowest representatives of the group *Equiseta hiberna*. *E. myriochaetum*, although having single rows of stomata, is large and has abundant whorls of branches, often with cones, and shows a closer affinity to the *Equiseta primitiva*. *E. ramosissimum* is still much branched and sometimes has the stomata in narrow bands but the other two species show a change toward the unbranched aerial shoot and single lines of stomata. Branches, however, may still appear the first season. In *E. praealtum* Raf. and *E. hiemale* L. branching is absent the first season unless the stems are injured and comparatively rare or sporadic afterwards, unless they are injured or have developed cones the first year. Their sheaths are of the extreme cylindrical type, soon becoming discolored and dry. The extreme is reached in the group with *E. variegatum* Schleich. and *E. scirpoides* Mx., which have decided reduction in the thickness and size of the aerial shoots and are developed in dense tufts or clusters. The sheaths are evolved along different lines from those of the *praealtum-hiemale* type, apparently being a direct modification of the primitive, green, ampliated condition with persistent teeth. In *E. scirpoides* the extreme re-

duction in size of stem is accompanied by the development of a solid pith which must here be regarded as a secondary condition originating from the hollow type. A similar evolution went on in the branches of the higher horsetails.

From the *ramosissimum-laevigatum* group, the members of which have evergreen stems, ampliated green sheaths, and apiculate cones, a small group branches off consisting of two closely related species, *E. kansanum* Schaffn. and *E. funstoni* Eat., the group *Equiseta ambigua*. The aerial shoots have become annual and the cones have lost the terminal points, through a more prompt determination of the growth of the terminal bud of the cone. In these respects they have evolved in the same manner as the two highest groups. In *E. kansanum*, sporadic development of whorls of branches on the main shoot is present but commonly the plant is entirely unbranched, being in its branching habits very much like *E. laevigatum*. In *E. funstoni*, a peculiar branching system has developed in that in typical cases the main, erect, naked shoots are surrounded at the base by a dense rosette of small prostrate branches. The ampliated green sheath is also modified, having a strongly incurved limb. *E. funstoni* is plainly the more extreme and represents the culmination in the series, *E. ramosissimum*, *E. laevigatum*, *E. kansanum*, *E. funstoni*.

COLUMBUS, OHIO

(To be continued)

Ferns—Fact and Fancies About Them—IV

F. E. CORNE

To turn now to the more practical part of our subject—let us see how we can be certain that a plant is really a true fern, and not a fern-like flowering plant. There are three essential things to remember about the ferns. Leaves or fronds and also roots spring directly from root stems, young fronds are coiled up or circinate, as it is called, in the bud, and they bear spores instead of seeds. Everyone is familiar with uncoiling fern fronds in spring. Mrs. Parsons quotes someone as saying that there is nothing in nature which looks "more aggressively new than a young fern." This seems to apply particularly to those whose tightly coiled crosiers emerge in soft scales or wool of the most delicate shades. I have in my garden an Interrupted Fern, *Osmunda Claytoniana*, one of the earliest arrivals each spring, which comes clothed in pure white wool just slightly flecked here and there with pale golden brown, the light bright green of the stipes or stem peeping through. For some days it is by far the daintiest thing in the garden. This wool falls off as the fronds grow larger, and is said to be eagerly sought by small birds to felt their nests with. The sturdy Royal Fern, *Osmunda regalis*, also looks young and lovely in pink or pale wine color. But the smooth glossy green of the Lady Fern and some others is less attractive.

The coiled-up condition of the young fronds is one great peculiarity of true ferns. The Botrychiums, Grape ferns, or Moonworts are only fern allies, and they are folded, not coiled, in the bud. In true ferns the smallest pinnules or divisions of each frond are coiled up toward the next larger, and that again toward the midrib. Some

ferns uncoil quickly, others continue to uncurl and grow from the tip indefinitely. A Lygodium or climbing fern is reported from Jamaica one hundred feet long, and still growing. We all know how persistently our Boston Fern remains curled at the tips as it continues to grow, and how careful one must be to protect those tips from injury. If the end of a fern frond is injured the frond stops growing. It may remain green for a long while but it grows no more, and the tip burns brown and unsightly.

In all true ferns the stem or stipe of each frond grows separately directly out from a rootstock. This is true even of the tree ferns. Most of our ferns have subterranean rootstocks while those of the tree ferns are aerial, taking the place of tree trunks, not tapering, however, like trees, but the same size all the way up, and topped by crowns of huge fronds. The sides are covered by brown scales and are often hung with numerous roots.

Rootstocks are, roughly speaking, of two widely different sorts called, respectively, caudex and rhizome. A caudex is roundish, short and thick, bearing its fronds in tufts or circles, while the roots grow in a tassel-like bunch. The rhizome on the contrary may be long and cord-like, growing rapidly, sometimes on the surface, but usually underground; sometimes even very deep down, and on the under side is a fringe of rootlets. On this kind of root stem every few inches, more or less according to the kind of fern, a bud will appear upon the upper part. Below this the roots grow more thickly, the bud develops into a frond and becomes a new plant. This is the manner of growth of the Hay-scented Fern or Dicksonia which covers so thickly many country roadsides; so also the brake which is a vigorous grower, allowing almost nothing to impede it. It has been known to go down as many as fifteen feet to get round a stone in its

way and then come up on the other side. Ferns with the short rootstocks throw out new crowns occasionally, but increase much more slowly. When they carry their fronds in circles like the Marginal Shield Fern the new fronds always grow out from the center and can be seen several months in advance coiled up and covered up with soft brown scales all ready for the following spring.

But the sporangia or groups of spore cases are the most characteristic and most important thing about the ferns. These are to be found, in the majority of ferns, on the under side, or sometimes on or close to the edges, and also sometimes, though very rarely, on the upper side of an ordinary leaf. Fronds bearing spores are called fertile, those without are sterile fronds. Those little groups of spore cases, called sporangia, are in different positions, and of different shapes, and help to identify genera. On examining fronds of our ordinary wild ferns, either freshly gathered or pressed specimens, it will be seen that these little groups, fruit dots as they are sometimes called, vary very much. On our common Polypody, known to everyone, they are round, conspicuous, yellow or bright yellowish brown when ripe, and often so large that the two rows almost cover the pinnules or leaf divisions on which they grow. On other species, the spinulose or Lace Fern of the florist for instance, they are small and dainty, while on the Marginal Shield Fern they grow close to the edge as the name implies. Again on another genus, the spleenworts, these fruit dots are not round but elongated. On the Woodwardias or Chain ferns they are also elongated and grow in rows end to end close to the midrib, thus forming little chains. In still others the fertile fronds are contracted, entirely or in part, and may be quite unlike the sterile fronds. Our Christmas Fern, so-called because it remains green through the winter and is much used by

florists at Christmas time, has the tip or apex of the fertile frond so contracted that it bears in some places the name of dagger fern.

The fertile fronds of the so-called "flowering ferns" are all very peculiar and puzzling to beginners until familiar with them. The Cinnamon Osmunda, for instance, bears in June within a circle of broad bright green sterile leaves a number of spikes of brilliant cinnamon colored spore cases, looking at a short distance exactly like clusters of tiny flowers. Again the Onocleas have spikes of tiny rolled up pinnules which inclose the spore cases, and which turn brown when ripe and resemble clusters of little nuts or seed vessels. The fertile fronds of the Ostrich Fern instead of being taller than the sterile ones, as is usually the case, are much shorter, only one quarter or a third as high, are rigid and upright and look much like dilapidated wornout quill feathers which some say gives the fern its name. But the green sterile leaves are also feather-like. Gather one when you have opportunity and place it in a vase of water. It will not live more than an hour or two, but will not shrivel up as so many do. Notice how gracefully the tip soon begins to droop and curl until it looks for all the world like a lovely green ostrich plume.

CAMBRIDGE, MASS.

Notes on American Ferns—XX[1]

WILLIAM R. MAXON

CHEILANTHES ALABAMENSIS (Buckl.) Kunze.—Though correctly ascribed to Arizona on the basis of specimens collected in the Huachuca Mountains by Lemmon in

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[1] Published by permission of the Secretary of the Smithsonian Institution.

1882, this species has not been known otherwise from the area beyond western Texas. It is thus of interest to put on record a specimen collected in Big Canyon, Guadalupe Mountains, New Mexico, June 4, 1924, by Dana W. Lee (no. 158). The present material, though scant, is unmistakable.

CHEILANTHES AEMULA Maxon.—On the basis of specimens collected by Mr. James H. Ferriss in 1903 Clute long ago[2] recognized as specifically distinct from *C. microphylla* Swartz a Texas plant which D. C. Eaton had regarded as a subdeltoid form of that species, and listed it as *C. Moritziana* Kunze. Inasmuch as *C. Moritziana* is ordinarily ascribed only to northern South America, the writer recently sought the loan of the Texas material, and at Mr. Clute's suggestion Mr. Ferriss sent on two specimens, one being from New Braunfels, the other from Devil's River, Texas. They prove to be *C. aemula* Maxon,[3] a species closely related to *C. Moritziana*, known hitherto only from Mexico and represented by the following specimens in the National Herbarium: Tamaulipas, *Palmer* 187 (type), 297, 563, 564; San Luis Potosí, *Purpus* 4883, 5483; Veracruz, *Purpus* 2173; Nuevo León, *Pringle* 1988; Coahuila or Nuevo León, *Palmer* 1413. Of *C. Moritziana* the following material is at hand: Venezuela, *Robinson & Lyon; Pittier* 6139, 9550, 10216, 11559; *Eggers* 13341; *Rose* 21650; *Fendler* 65; Colombia, *Lehmann* 2217, 5441, 6057. From a comparison of these series it is seen that *C. Moritziana* differs constantly in its lesser size, its less strongly deltoid blades, its smaller, more distant, rounded, mostly cuneate segments, and its non-continuous indusia, as also in its much thin-

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[2] Fern Bull. **12**: 44. 1904.

[3] Contr. U. S. Nat. Herb. **10**: 495. 1908.

ner texture and in character and distribution of pubescence. In *C. aemula* the sori are confluent, the continuous indusia being only occasionally interrupted by a shallow indentation. The two Texas specimens have been presented to the National Herbarium by Mr. Ferriss, who states that the species is not uncommon in the region whence they came.

CHEILANTHES CASTANEA Maxon.—In the course of field work in the vicinity of Carlsbad Cavern, New Mexico, undertaken under the auspices of the National Geographic Society early last year, Mr. Vernon Bailey collected excellent specimens of this interesting species, which had been known previously only from Mexico (Coahuila, *Palmer* 1390, type; Hidalgo, *Pringle* 11277). Oddly enough, an additional specimen from western Texas turned up a few weeks later among a shipment of plants received from the University of Texas, this having been collected in the Davis Mountains, September 15, 1918, by Prof. B. C. Tharp (no. 2177). Another species is thus added to the United States fern flora.

Although both Mexican collections of *C. castanea*[4] were originally distributed as *C. gracillima* D. C. Eaton, a species ranging from British Columbia to Nevada and central California, the relationship is really with *C. Eatoni* Baker. From this *C. castanea* differs very evidently in its fewer and several times larger segments, which, though at first very thinly and loosely grayish-tomentulose above, are soon glabrate and at all stages are distinct and separate; in *C. Eatoni* the segments are closely enveloped and invariably held together by a mass of entangled hairs. *C. castanea* is less closely allied to *C. tomentosa* Link. The name alludes to the rich tawny

[4] Proc. Biol. Soc. Washington **32**: 111. 1919.

color of the spirally crispate hairs, which form a copious rather loose tomentum thickly covering the under side of the segments.

SELAGINELLA NEOMEXICANA Maxon.—This species was founded on several collections from the Organ Mountains of New Mexico and has since been reported only from the vicinity of Paradise, Arizona. An eastward extension of range is noted in specimens from Mt. Franklin, El Paso, Texas, recently received from Mrs. Elsie McE. Slater. The plants are said to have come from the perpendicular walls of a canyon on the southwestern flank of the mountain. It is apparently a rare species.

WASHINGTON, D. C.

Recent Fern Literature

The search for *Lycopodium* prothallia goes on[1] so successfully that the authors of one of the latest reports on them—Professors Alma G. Stokey and Anna M. Starr, of Mt. Holyoke College—say that they are probably much less rare than has been supposed—a statement which seems eminently justified by the commonness of mature plants which must have originated somehow. The difficulty is to see your first prothallium, or the tiny sporeling which indicates its probable presence; once your eye is trained and you have learned where to look and, maybe, the technique of sifting prothallia out of a trowelful of earth, finding them is a comparatively simple matter—though still one of care and patience.

Professors Stokey and Starr report seven stations in "western Massachusetts"—which in this case means the Connecticut valley—at which they have found prothallia. *L. obscurum* was represented at five of them, *L. clava-*

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[1] See FERN JOURNAL 13: 122, 1923.

tum at one, and at three what the authors call *L. complanatum*. In that region, however, their plant can hardly have been the typical form of the species; it must have been the var. *flabelliforme*. The distinction would seem to be worth making, as a matter of taxonomic and geographic exactness. The variety is confined to a comparatively restricted area in eastern North America, mostly in the northeastern United States. Typical *L. complanatum* is a more northern plant and, as so often in similar cases, ranges across the American and Eurasian continents. There are interesting possibilities here, but though American investigators of *Lycopodium* prothallia have been at the pains of distinguishing the comparatively unimportant and possibly merely ecological variety *dendroideum* of *L. obscurum*, none of them has thought it worth while to indicate which of the two elements of *L. complanatum* he had, or whether prothallia of the American plant showed any differences from those of the European. It is true that Spessard's drawing (Bot. Gaz. **63:** 71, 1917) shows no obvious difference; but in northern Michigan, where he worked, either typical form or variety might occur, and there is no telling which he had.

The seven stations were, roughly, of three types—mixed hardwoods on a slope above a body of water, small depressions in dry mixed hardwoods, and a hemlock grove. In one case only was there any considerable deposit of leaves; in none was there any herbaceous growth. In all the soil was sandy and well-drained, with considerable humus. It was found in the laboratory that prothallia would not live long in undrained soil, though well developed sporelings survived. The authors conclude that though "old plants are frequently found in swampy places, the indications are they did not start there." Allowing for the power of travelling presumably pos-

sessed by the creeping stems of these three species, it may well be that a sufficiently old plant might be found at some distance from its point of origin; but the present writer cannot recall having seen specimens of any of the three (with the possible exception of *L. obscurum*) in really swampy places. Perhaps the readers of the JOURNAL can throw light on the habitat of these plants, as they did on that of *Ophioglossum*; they are hereby invited to do it.[2]

Dr. Otto Degener reports four other stations in Massachusetts for prothallia of "*L. complanatum*" and *L. obscurum*, var. *dendroideum*. The latter were found in great numbers—three hundred in one small area—and are described in detail and illustrated. Various interesting facts about the prothallia of both are recorded. Sporelings, for instance, are produced equally well whether the surface of the prothallium which bears the reproductive organs is vertical or horizontal, or, in the latter case, on the upper or under side. Young plants of *L. complanatum* [var. *flabelliforme*] have the leaves scale-like at first, then awl-shaped, up to 4 mm. long, and arranged in whorls of three about 2 mm apart. Only after the stem has begun to branch do the leaves become four-ranked and the lateral ones developed so as to give the characteristic flattened effect to the branches.[3]

C. A. W.

FRAGRANT MASSACHUSETTS FERN.—Last August, while on a visit to Marion, Mass., at the head of Buzzard's Bay, I passed one day a bit of woodland, of mixed trees, where, as far as the eye could reach, the underbrush had

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[2] Stokey, Alma G., and Starr, Anna. M. Lycopodium prothallia in western Massachusetts. Bot. Gaz. 77: 80–88. March, 1924.

[3] Degener, Otto. Four new stations of Lycopodium prothallia. Bot. Gaz. 77: 89–95. Pls. XI–XIII, 2 figs. March, 1924.

been entirely supplanted by a luxuriant growth of cinnamon fern (*Osmunda cinnamomea*). Nestling under the larger fronds I noticed some much smaller ones which superficially resembled the half-grown leaves of the sensitive fern (*Onoclea sensibilis*). I was quickly over the low stone wall which separated the wood from the road, and a short search revealed several plants with long, slender, contracted fertile fronds which confirmed my hope that I had at last found the net-veined chain fern (*Woodwardia areolata*) with which I was until now familiar only through pressed specimens.

Nearby and scattered through the wood I found numerous plants of the Massachusetts fern (*Aspidium simulatum*) fronds of which and of other ferns I gathered to place in water, and that evening my room was filled with a delicate, spicy fragrance. Wishing to make certain that this fragrance emanated from the Massachusetts fern, I returned to the wood a few days later and gathered a quantity of it, noticing as I did so that almost every frond was delicately sweet, and this, it seemed to me, was particularly noticeable in the immature fertile fronds. The ground in which they grew, though not swampy, was so soft and spongy with moss and partly decayed pine needles that several roots were easily pulled up, and these I took with me later to Maine and planted them there in a mixed fern bed, where, if they live, they will be under observation.

As Mr. Weatherby tells me that a fragrant form of the Massachusetts fern seems not hitherto to have been reported, I am glad to pass on this bit of information to the readers of the FERN JOURNAL.—F. E. CORNE, *Cambridge, Mass.*

THE SPINULOSE FERNS OF TIM POND, MAINE.—The third to the twelfth, inclusive, of September, 1924, were

spent by the writer botanizing and trout-fishing at a beautiful little mountain lake (misnamed "Tim Pond") down in Maine, less than twenty miles from the Canadian border. Along the higher parts of the rough and rocky trail leading from the town of Stratton to "Tim," as well as in the more open parts of the woodlands and along the paths around the lake, at an elevation of about two thousand feet above sea-level, the broad-leaf spinulose fern, *Dryopteris dilatata*, var. *americana*, is abundant. It grows especially large and luxuriantly amongst the fallen, well rotted tree trunks, where the soil is saturated with moisture. From its prostrate rootstocks spring buds that soon develop into good sized plants, spreading in all directions and thus forming large colonies.

Scattered about are many thrifty plants of the evergreen spinulose fern, *Dryopteris intermedia*, their narrower, dark olive fronds contrasting pleasingly with the much broader and lighter, yellowish-green leaves of var. *americana*. It is only when we see these two species growing together that we realize how very different they are in color.

At the time of my visit light frosts had already left their mark on the var. *americana* in the less sheltered spots, turning more or less of each frond to a dull, homely brownish-olive.

The largest and finest patches of these ferns were found in the half shade of the deciduous trees, especially beneath the yellow birches, rather than in the denser shade of the spruce and fir balsams. Fronds of var. *americana* more than forty-six inches long and from eighteen to twenty inches broad were not uncommon. A few specimens of typical *Dryopteris spinulosa* were found in swamps adjacent to the lake.—EDWARD H. CLARKSON, *Newburyport, Mass.*

American Fern Society

Franklin Tanner Pember, a member of the Society since 1908, died at his home in Granville, N. Y., March 6, 1924. He was born in South Granville, November 2, 1841, and educated in the schools there and at the Fort Edward Institute. For a number of years he was a dealer in furs in New York City; later he acquired large holdings of real estate in California and was associated with various business and public enterprises in Granville. From a boy he was deeply interested in natural history. He read widely in this as in other subjects and was the friend and co-worker of several well-known naturalists. He was a great traveler, having visited every state in the Union, most of the countries of Europe, Egypt, and Palestine. He used his journeys partly to broaden his knowledge of his favorite subjects and in gathering specimens. These have found a permanent and worthy resting place in the library and museum which he gave to the town of Granville. To this institution he and Mrs. Pember (born Ellen J. L. Wood) gave not only money, but much devoted and intelligent attention. In addition to a sympathetic interest in all its activities, Mr. Pember was untiring in building up the natural history collection, and for fifteen years spent two afternoons of each week in acting as host and instructor to all who visited it.

Miss Mina Keyes Goddard, a member of the Society since 1897, died at Lexington, Mass., her birth-place and for most of her life her residence, August 30, 1924. She was born November 2, 1864. After completing the course at Miss Nash's school in Lexington, she studied drawing and painting in Boston and later taught drawing at Dean Academy, Franklin, Mass. Her health

breaking down, she gave up teaching, and from that time turned her attention especially to botany. For a long time, she spent some weeks annually with her friend, Mrs. Nellie F. Flynn of Burlington, Vermont, collecting and mounting specimens for Mrs. Flynn's large herbarium. After the latter's death in 1922, Miss Goddard continued to mount specimens left by her, hoping to complete the work on her friend's collection, which is to be given to the University of Vermont; but death came too soon.

Outside of botany, Miss Goddard's main interest was in local history. She had done excellent work on Hudson's revised history of Lexington, and was Curator of the Lexington Historical Society and Custodian of the Hancock-Clarke house—which stood, facing Lexington Green, when the first fighting of the Revolution took place there and is now preserved by the Historical Society as a public monument and museum.

New Members:

Bond, Miss Nancy K., 201 East 7th St., Superior, Wis.

Durand, Herbert, Crow's Nest Wood, Bronxville, Westchester County, N. Y.

Hunter, Dr. Mabel R., Glennville High School, Cleveland, Ohio.

Knappen, Mrs. Theodore M., 2925 Tilden Ave., N. W., Washington, D. C.

Leske, E. J., 459 Grand Ave., Cincinnati, Ohio.

Richardson, H. H., 10 State St., Boston, Mass.

Changes of address and corrections in the recently issued list of members:

Benfield, Rev. W. A., Link's Grove, W. Va.

Cornman, Mrs. L. R., 2852 Adams Ave., San Diego, Cal.

Graves, E. W., Stockport, Iowa.

Halsey, Miss Alice, 3941 Grand Central Terminal, New York City.

Heermance, Miss Laura W.; not Hurmace as in the list.

Humphries, George S., 17 Battery Place, New York City.

Monroe, Will S., R. D. No. 3, Waterbury, Vt. (after April 1, 1925).
Noyes, Miss Elmira E., P. O. Box 326, Portsmouth, Va.
Petty, Prof. W. J., 708 Central Ave., Ocean City, N. J.
Scott, Mrs. Willard, 1651 Beacon St., Brookline, Mass.

Mr. O. A. Farwell, whose correct address is 271 Smith Ave., Detroit, Mich. (not South Ave., as in the list), has become a life member.

Mr. E. W. Graves, Stockport, Iowa, has a few specimens of *Pellaea glabella*, which he offers to members for postage. He would also like to exchange *Lycopodium carolinianum* or *L. pinnatum* for *L. obscurum*.

The Secretary has received a communication from the American Association for the Advancement of Science, asking if our Society intends to hold a meeting during the next convocation week of the association at Kansas City, Mo., December 28, 1925 to January 2, 1926. Will any of our members who think they could attend a meeting at that time and place please so notify the Secretary? The officers will attempt to arrange for a meeting if they have assurance that a few, at least, are likely to be there; otherwise, the attempt would hardly be worth while.

Report of the President for 1924

The year just closed has been what may be termed a normal one for the American Fern Society. Our membership, which remains at about 300, and the varied contents of the JOURNAL afford a fair index of our well-being as a flourishing organization. As has so often been pointed out, much more in the way of publication and constructive work could be undertaken with a greater

number of members, but even with our present membership a great deal of instructive and entertaining matter is being published and the amount of new information recorded is highly creditable. In the way of regional data the more interesting new records relate to Arkansas, a state which has been much neglected botanically. An example of the interest that attaches to a study of the commoner species is found in the attention directed to *Dryopteris spinulosa* and closely related forms. This is a subject in which valuable assistance can be extended by most members of the Society through personal study. The same might be said of the ternate Botrychiums, among other groups, though here the criteria are less satisfactory.

One pleasant feature of the year was a stated meeting of the Society held in Washington, January 1, 1925, during Convocation Week, as reported elsewhere in the JOURNAL. Unfortunately a snowstorm and further threatening weather prevented the scheduled field trip along the Potomac. Of greater interest, perhaps, would be meetings in mid-summer, held whenever members of a given region could come together for the purpose. Several such gatherings have taken place during the past 20 years, and it will be agreed that they are not only pleasant but extremely helpful. Can they not be held more frequently? During the early days of the Society, when members were few, correspondence was more general than now and every one became more or less "acquainted." A return to this practice would be worth while, and would doubtless lead to small summer "convocations," the benefits of which are too obvious to need mention.

As for the future, let us keep on in our effort to obtain new members and let us help each other and our faith-

ful editors by sending in our best results for publication in the JOURNAL. We know we have chosen for study the most interesting subject in the world, but very commonly we fail to be as inquisitive about it as we ought. Let us make the coming year count!

WILLIAM R. MAXON, *President.*

Report of the Secretary for 1924

From the standpoint of the Secretary there is little to report, beyond the changes in membership, noted already in the FERN JOURNAL. The revised List of Members, prepared for publication in November, showed 300 names. Two more were added during the closing months of the year. The total, 302, is, however, because of the thorough revision of the lists for the printed List of Members. smaller than the number reported last year, 310, although fourteen new members were added in 1924. Death has claimed among others, two of our more notable members, Prince Roland Bonaparte, of Paris, France, and Rev. John Davis, who was Vice-President of the Society for 1915 and 1916. Mr. Oliver A. Farwell has been elected a Life Member.

There were no meetings of the Society during the year though the tide turned on New Year's Day, 1925, with the meeting at Washington, D. C., in connection with the meeting of the American Association for the Advancement of Science.

The loaning copies of the FERN JOURNAL have been but slightly used this year. Do the members of the Society know that such can be secured from the Secretary for the asking and postage costs?

C. S. LEWIS, *Secretary.*

Trenton, February 27, 1925.

Report of the Treasurer for 1924

RECEIVED

On hand January 1		$ 450.54
Membership Dues:		
1922	$ 10.50	
1923	39.50	
1924	343.58	
1925	15.00	
1926–1927	3.00	
Total	$411.58	
Subscriptions to the Journal	78.96	
Sales back numbers, to Emergency Fund	40.40	
Gifts to Illustrating Fund	22.18	
For extra printing in Journal	15.50	
For reprints from Journal	16.70	
Advertising	4.18	
Interest	16.00	
Collection fees	.30	
Total receipts		605.80
Grand total		$1,056.34

PAID OUT

Treasurer's expenses	$ 14.70	
Secretary's expenses	8.75	
Curator's expenses	2.90	
Council Order No. 49: Paid out of the Reprint Fund	25.00	
Council Order No. 50: Transferred, Emergency Fund to Permanent Fund	100.00	
Council Order No. 52: Postage, notices for January meeting	3.54	
Membership List: Budget allowance	$ 20.00	
Council Order 53	8.25	
		28.25
Journal Expenses:		
Printing four numbers	$257.00	
Printing extra pages	8.35	
Printing index, etc.	12.20	
Printing title page and contents	9.00	
Illustrating—budget	15.00	
Postage and exp.	26.80	
Insurance on back nos.	10.00	
Budget expense	$338.35	
Illustrating Fund	39.60	
Special gift (printing)	15.50	
Total expense of Journal	$393.45	393.45

Paid for reprints afterwards returned	16.66	
Total paid out		593.25
Balance on hand		$ 463.09

This balance is made up as follows:

EMERGENCY FUND

On hand January 1	$146.88	
Received	40.40	
	$187.28	
Transferred to Permanent Fund C. O. No. 50	100.00	
Balance		$ 87.28

ILLUSTRATING FUND

On hand January 1	$ 18.43	
Received	22.18	
	$ 40.61	
Paid for Journal	39.60	
Balance		1.01

SPECIAL REPRINT FUND

On hand January 1	$ 13.07	
Received C. O. No. 49	11.93	
	$ 25.00	
Paid R. C. Benedict C. O. No. 49	25.00	
Special order held for catalogue of Herbarium		25.00
General Fund from dues, subscriptions, etc.		349.80
		$463.09

THE SPECIAL PERMANENT FUND established by Life Memberships and transfers from Emergency Fund (which comes from the sale of back numbers of the JOURNAL), now stands as follows:

On hand January 1	$423.16
Life membership received	25.00
Transferred from emergency	100.00
Interest received	24.61
Balance on hand	$572.77

There are no unpaid bills.

I am very grateful to the members of the Society for their assistance in the conduct of this office.

Respectfully submitted,

JAY G. UNDERWOOD, *Treasurer.*

Report of the Editors for 1924

Partly because of a change of printers, the first number of the JOURNAL for the year was very late, but, with the aid of good and prompt service on the part of the new printers, the other numbers were issued near the close of their respective quarters. Copy has come in slowly, but in just sufficient quantity and in good variety and quality. Through the generosity of Mr. E. H. Clarkson and of others who have contributed to the illustrating fund in previous years, we have been able to publish eight full-page plates and two text-figures. We close the year with a balance of $1.01 in the illustrating fund, but with the feeling that the rest of it has been well spent.

The JOURNAL is to be congratulated on the interest of its contributors, which enables us to keep it up to its present level. Even so, it is not easy for us to serve fully the various tastes and needs of the different members of the Society. What we hope to accomplish is that each number shall contain something of interest for each of our readers. Doubtless we do not always attain this, but we try for it. This year we have been particularly fortunate in two respects, first, in getting Miss Corne's articles on ferns in their many aspects, and second, in the beginning of Dr. Maxon's series of descriptions of new tropical American ferns. It may seem strange, but it is a fact that such general, non-technical, and readable articles as the former are about the hardest to get; and

the latter will add much to the scientific value of the JOURNAL.

At the date of publication of this report we have a comfortable supply of copy on hand, but not so much that we do not want more. We heartily second Mr. McColl's invitation to the members to tell, in the JOURNAL, of their unusual finds.

R. C. BENEDICT,
E. J. WINSLOW,
C. A. WEATHERBY,
Editors.

The Washington Meeting of the Society

A small but interested group of the members of the Society and others gathered in the Central High School, Washington, on New Year's Day, 1925, for a mid-winter meeting in connection with the Washington meeting of the American Association for the Advancement of Science. Dr. Maxon presided and, after a few words of welcome, presented "Some Curious Ferns." He literally did that, for he showed us a series of sheets from the United States National Herbarium, which he described with running comments. Among the specimens displayed, some represented unusual foreign species of well known United States genera, and others were of interest as representing groups not found within our limits, differing in many important respects from our familiar species. Some of the former will be illustrated in a proposed series of short papers.

Dr. Edgar T. Wherry, of the Department of Agriculture, submitted a paper summarizing the results of his study of the Appalachian Aspleniums, in which he aimed to trace their origin and development. Dr. Wherry's paper will be published in the next number of the JOURNAL.

Dr. R. C. Benedict, of the Brooklyn Botanic Garden, carried us through the interesting but rather complicated story of the development of the variations of the Boston Fern, illustrating his talk with a large series of fronds of the ferns themselves. Of greatest interest was a series of utterly diverse plants, representing the progeny of a cultivated varietal form with fertile spores, recently discovered. Some of the results of this more recent investigation will shortly be published.

Miss Mabel R. Hunter, of the Department of Botany, Syracuse University, described the characteristic habitat of the Hart's-tongue (*Phyllitis scolopendrium*) in central New York. The soil is distinctly alkaline, and the ferns grow either in loose talus or on the slopes of the ravines, generally under the protection of cliffs. They love cool spots and along with the Bulblet Bladder Fern favor places where the butternut, maples, basswoods, and hemlocks grow. General discussion followed, with mention of the Tennessee habitat, where the fern grows in sticky clayey soil. Apropos of efforts now being made to establish the Hart's-tongue in new localities it was pointed out that the plants should be set out on cool shady slopes having a deep, porous woods-soil.

Dr. Paul Bartsch, of the Smithsonian Institution, gave a delightful account of the ferns occurring in the neighborhood of Washington, illustrated by a series of lantern slides.

Prof. A. H. Wright, of Cornell University, spoke briefly upon the smaller Botrychiums and urged a more careful study of this whole group of ferns.

A heavy snowfall the night before prevented the field trip which had been planned, but in spite of this disappointment to the out-of-town members of the Society the Washington meeting was counted a decided success and proved thoroughly enjoyable.

C. S. LEWIS, *Secretary*.

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A QUARTERLY DEVOTED TO FERNS

Published by the

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EDITORS

R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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JUL 8

The American Fern Society

Council for 1925

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Main Lines of Evolution in Equisetum —II

John H. Schaffner

From the primitive *xylochaetum-giganteum* type, with its large, perennial, branched stems, banded stomata, and apiculate cones, another prominent branch or group is derived, the *Equiseta aestivalia.* The stems are annual with prominent whorls of branches and the cones are without a point. The stomata are scattered in broad bands and the sheaths are rather primitive with persistent teeth. *Equisetum fluviatile* L. is the lowest species of this group, followed by the much smaller *E. palustre* L. in which the whorls of branches are much less prominent and often irregular, frequently appearing bushy. The cavities in the internodes of the latter species are much reduced and the sheaths are ampliated, a condition probably retained from the ancestral type. The large branches at least, of the whorls are hollow. These species also show a more or less prominent peduncle at the base of the cone, which is true of all the higher Equiseta. The other two members of the group, *E. diffusum* D. Don and *E. bogotense* H. B. K., are still more extreme, having solid branches, and in the latter species the ridges of the main stem are only four to nine. *E. diffusum* often has solid, main stems but sometimes

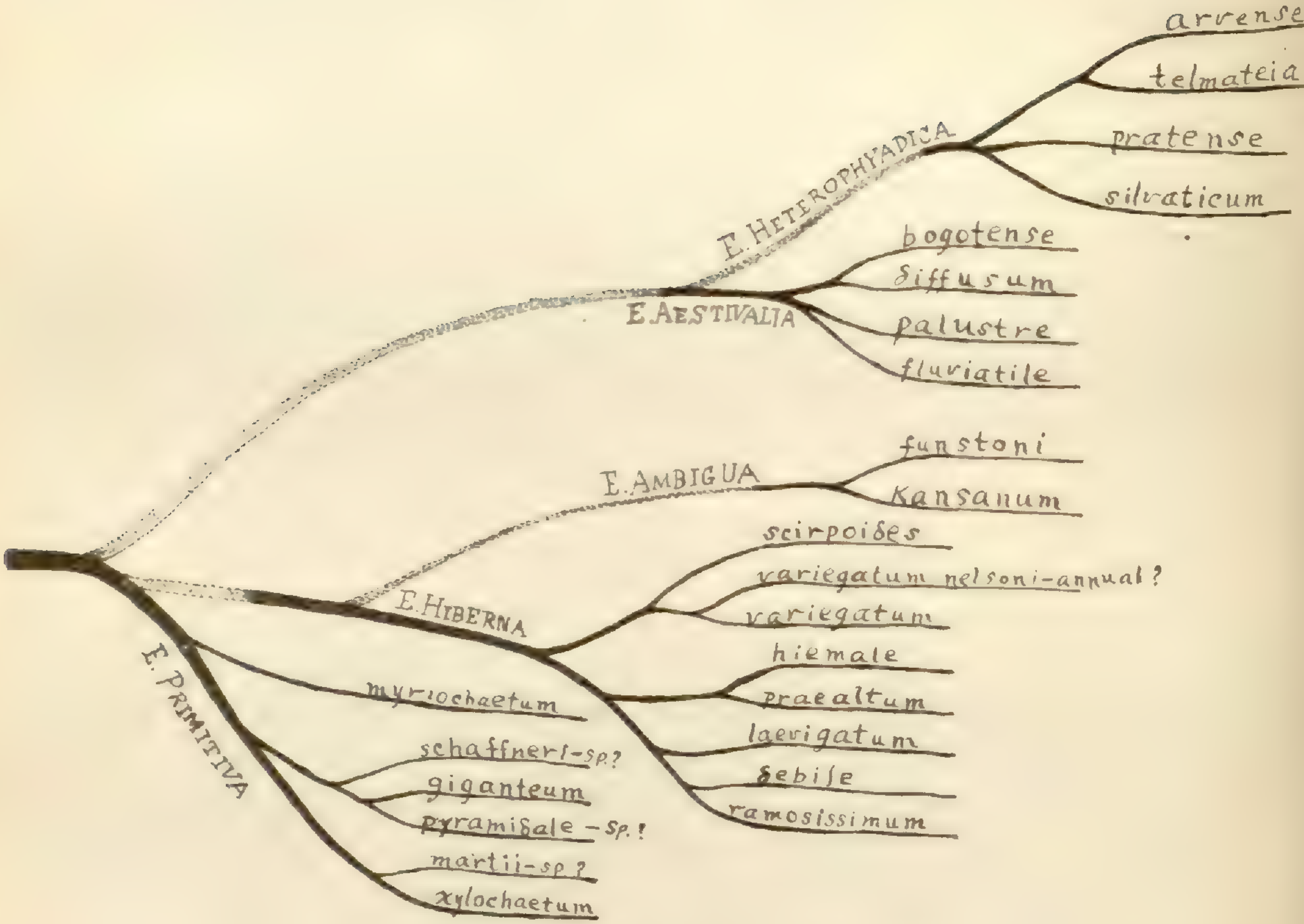
[Vol. 15, No. 1 of the Journal, pages 1–34, plates 1 and 2, was issued May 26, 1925.]

they are still hollow, while in *E. bogotense*, the small main stems are solid. As intimated above, there is a paralleled development to that which has taken place in *E. variegatum* and *E. scirpoides*.

The last group, the *Equiseta heterophyadica*, are apparently a direct offshoot from the main line which ended in the four modern species of the *Equiseta aestivalia*. Like them, they have annual stems and the cones are without points. The sheaths of the main stem are also more or less ampliated. The main evolutionary development consists in the progressive specialization of the fertile shoot, giving a greater and greater dimorphism with the sterile shoot. The four species are *E. silvaticum* L., *E. pratense* Ehrh., *E. telmateia* Ehrh., and *E. arvense* L. All have solid branches having repeated the specialization developed in the higher *Equiseta aestivalia*. In all four species there is a decided loss of chlorophyll in the internodes and usually also in the sheaths of the fertile shoot; and the whorls of branches are disappearing. In the first two species the tips wither after anthesis but in the meantime whorls of green branches begin to develop and the fertile shoot continues as a photosynthetic system. *E. silvaticum* has a prominent specialization in that the branches are usually abundantly compounded, which is a rather rare condition in other species. The two most extreme species are *E. telmateia* and *E. arvense*, both of which show the greatest dimorphism between the sporophyll-bearing shoot and the sterile shoot. The very short-lived fertile shoot has not only lost its chlorophyll or the most of it, but also its branching habit, thus repeating the condition so prominently evolved in the *Equiseta hiberna* and *Equiseta ambigua*, while the sterile shoot retains the prominent system of whorled branches. Both the hered-

itary factors and the response of these factors to internal functional states as well as to the external environment in the expression of morphological characters are very complex. The evolutionary progression in the fertile shoot is shown by comparing *E. fluviatile* with *E. silvaticum* and *E. pratense* as intermediate types and with *E. telmateia* and *E. arvense* as the extreme culmination. *E. telmateia* has highly specialized branches and branch sheath teeth, which have double keels and it is much larger than *E. arvense.* The latter is appropriately placed as the culmination type because it shows the same tendencies of reduction in size as do the extreme species of *Equiseta hiberna* and *Equiseta aestivalia.* There is also a tendency in these most highly specialized fertile shoots to eliminate the stomata and in *E. telmateia* the stomata are sometimes entirely lacking on the internodes.

It is interesting to note, therefore, that in these highly evolved horsetails the aerial shoots show the same kind of progressive evolutionary differentiation as do the leaves of some ferns and the seed plants. There is a progressive series from the condition where there is no difference between the vegetative characters of sporophylls and foliage leaves to the extreme condition of dimorphism in which the sporophyll loses its photosynthetic activity and green color almost entirely as well as other, morphological characters possessed by the foliage leaf. Examples of such progressive differentiation series are seen in passing from *Todea barbara* through *Osmunda claytoniana* to *Osmunda cinnamomea*, or from *Polypodium virginianum* or *Dryopteris marginalis* through *Polystichum acrostichoides* to *Onoclea sensibilis*, where the same type of dimorphism appears between the sporophylls and foliage leaves as is so prominent in the Gymnosperms and the Anthophyta.



Lines of Evolution in Equisetum

Comparing *E. arvense* with the primitive *E. xylochaetum* or *E. giganteum*, therefore, shows the following six progressive evolutionary advances in fundamental characters: (1) The aerial shoot passes from the perennial to the annual condition; (2) the fertile shoot changes from an abundantly branched condition to a specialized stem without branches; (3) the green fertile shoot is differentiated until it possesses brown internodes, sheaths, and cones through the loss of all or nearly all its chlorophyll; (4) the fertile shoot is very short-lived, soon withering, as compared with the sterile shoot; (5) the cone is more definitely determinate and does not develop a point at the tip; (6) the cone evolves from the condition in which it is nearly sessile or very short-stalked in the highest vegetative sheath to an advanced condition with a rather prominent peduncle having a specialized, reduced, calyx-like sheath just below the lowest whorl of sporophylls. This structure may represent a whorl of sterilized sporophylls. If so, it would have to be regarded as a true perianth. It is perfectly plain, therefore, that from an evolutionary point of view, *Equisetum telmateia* and *E. arvense* are the highest living horsetails and *E. xylochaetum* and *E. giganteum* the lowest.

In agreement with the relationships and series outlined above, the phyletic classification can be shown graphically as a branching system as in the accompanying diagram.

COLUMBUS, OHIO.

Proper Use of the Name Filix

KENNETH K. MACKENZIE

The older writers on plants had but a few fern names. Of the names used by them the name *Filix* was probably the most popular. It was ultimately used for many species of ferns, especially after European botanists began to study tropical ferns. In the early days, however, its use was very largely, if not entirely, confined to two very common and well known European ferns. One of these ferns was *Filix mas* or the male fern, and the other was *Filix foemina* or the female fern. And here let me say that the female fern of all writers before the time of Linnaeus as far as I have seen was the bracken (*Pteris aquilina*), and not the fern which is now called the female fern (*Athyrium filix-foemina*).

The very early writers did not have ideas of genera, and genera divided into species, as a basis of nomenclature developed as it is now. When we speak of an oak we are not thinking of classification, but we are merely identifying an organism. Similarly when the early writers named a plant in Latin they were merely identifying plants, and at first were not attempting to build up a system of classification.

As time went on and a system of classification became more and more necessary the old Latin names of plants naturally came into use as the names for genera and species. But side by side with their use for this purpose, their use in the old popular sense continued. For example, when a writer referred to and described either (1) the male fern or *Filix mas* or (2) the female fern or *Filix foemina*, it did not necessarily mean at all that he was attempting to describe a genus *Filix mas* or a genus *Filix foemina*. He was in fact merely giving

vernacular names in English and also in Latin. This kind of use persisted for centuries, especially in popular or medical works. And one should never think of treating a name so used as a technical generic use. The point is of present practical importance when later on I will come to deal with the name *Filix* as used in Hill's Family Herbal published in 1755.

The male and female ferns were favorite subjects for study and illustration by the early writers, and one can find a number of illustrations of both species. The earliest I have seen are in that marvelous work of Fuchs, De historia stirpium, published in 1542. He gives accurate and beautiful large-size illustrations of both *Filix mas* (p. 595) and *Filix foemina* (p. 596). The copy of the work I saw had the illustrations colored by hand, and considering the time it was published and the previous state of botanical knowledge it is certainly to be regarded as one of the great botanical works of all time. It is a pleasure to know that the beautiful genus *Fuchsia* is named after its author.

Matthiolus Commentarii . . . Dioscorides (p. 640, Italian edition of 1560; p. 1290–1, edition of 1565) likewise illustrated the same two ferns under the same names; as also did Lobel (Stirpium Icones 812, 1581); Daleehamps (Hist. Generalis 1222, 1587); Tabernaemontanus (Kreuterbuch **2**: 500, 1613; and p. 1181, edition of 1687); Dodonaeus (Pemptades 462, 1616); and Parkinson (Theatrum Botanicum 1031, 1640). Tournefort (Elem. Bot. 428, pl. 310–313, 1694; Institutiones p. 536, pl. 310–313, 1719) also lists them both, although his plates do not illustrate the bracken.

A considerable number of other authors of the period could be cited to the same effect, but the above will be sufficient to show how universally the names were in use by many generations of scientists.

When, however, it came to Linnaeus we find him giving up the name *Filix* altogether, and applying to the bracken the name *Pteris*, while the male fern went into his all-embracing conception of *Polypodium* (Hort. Cliff. 473, 475, 1737; Gen. Pl. 780, 784, 1737). And this is the arrangement which he kept to in the works which form the starting point for present day nomenclature (Sp. Pl. 1073, 1090 (1753); Gen. Pl. Ed. 5, 484, 485 (1754).

After 1753 the name *Filix* was used by authors as follows:

I

The first use of the name *Filix* after 1753 appears to have been by Hill in his Family Herbal (p. 171) published in 1755. This was a non-scientific work in which Hill gave no generic descriptions. It was a work in which Hill used the names male fern or *Filix mas* and female fern or *Filix foemina* in the vernacular sense, just as they had been in use for centuries before. He had no intention whatever of using the name *Filix* as a generic name.

In fact Hill had ideas of his own about generic names. He was very fond of a peculiar system of double headers; and so in his more formal work, the British Herbal (which appeared the next year, 1756, and which must have been in largely completed condition when his Family Herbal was issued) we find two genera characterized by him, as such, one called *Filix mas* (p. 527), and another *Filix foemina* (p. 528), and under both of the genera so named by him he gave various species.

I do not see the slightest justification for the statement of Mr. O. A. Farwell that "The names *Filix mas* and *Filix foemina* as here (Family Herbal) used by Hill must be considered as true binomials and not in any

sense as generic names as employed by him a year later in the British Herbal'' (Rep. Mich. Acad. **18**: 81, 1916). And I cannot follow him in using the name *Filix* on any such basis for the genus called by other scientists *Thelypteris*. If Hill had any thoughts of fern genera at all in the Family Herbal he must have had the same two genera in mind as he had a year later and these were *Filix mas* and *Filix foemina* and not a genus *Filix*.

II.

The next use of the name *Filix* was I believe by Ludwig in 1757. On page 142 of his Institutiones he has an analytical key, of which the following words and phrases are in point: "I. Terrestres. A. Herbaceae. IV. Epiphyllospermae folio. b. magis composito. 2. pinnato, pinnulis *a* ad neruum usque sectis FILIX."

On page 149 Ludwig gives "Filix ramosa, foliolis pinnatis'' as a species of *Filix*. This refers to the bracken. "*Filix ramosa*" with various additions, was the technical scientific name of the bracken in the old nomenclature, and the last part of Ludwig's phrase "*foliolis pinnatis*" is part of the Linnaean description of the bracken (Hort. Cliff. 473).

As far as I can see Ludwig's publication fully complies with all codes of nomenclature, and the name *Filix* should be regarded as a synonym of *Pteris*, if *Pteris aquilina* is taken as the type of the genus *Pteris*. If *Pteris aquilina* is not taken as the type of the genus *Pteris* and it is treated as belonging to a distinct genus, the proper name of such genus is *Filix* and not *Pteridium* Scop.

III.

The next use of the name *Filix* was by Adanson (Fam. Pl. **2**: 20, 557) in 1763. His description of *Filix* as I

read it is "Paquets de fleurs ronds, disposés sur 2 rangs sous chaque division des feuilles. Enveloppe 1 valve. Globules environnés d'un anneau elastique." (p. 20.)

On page 19 he says (here somewhat freely translated):

"In studying the various points to be considered, one is convinced that the male fern, Filix non ramosa, the Filix montana argute denticulata, and some others which are confounded with the genus Polypodium, and the Filix mollis glabra, which has been made a kind of Acrosticum, form a genus distinguished from all others. Likewise the Filix baccifera and the Filix minor non ramosa, of which two species of Polypodium have been made, form one special genus. The Polypodium angustifolium folio vario, and some others are mingled in the order of Osmondes; the Acrosticum and the Scolopendrium or Lingua cervina ought to be placed in the same genus. The Filix lusitanica Polypodii radice, which has been made a kind of Polypodium is at least very near to the genus Adiantum; finally the Polypodium and the Lonchitis are two species of the same genus; the Ceterach, the Trichomanes and the Ruta Muraria are only but one genus."

On page 558 we find the following:

"**Filix Fuchs. Page 20.**
Pteris Diosc.
Pterineon Diosk.
Anasforon Diosc.
Dasuklonon Dios.
Fanaria Rom.
Laculla Rom.
Osmundula Lonic.
Filix baccifera Corn. 5.
Mor. s. 14 t. 3 f. 10
Fougère Gall."

The figures of Cornut and of Morison are both excellent figures of *Cystopteris bulbifera*, and the description

of *Filix* by Adanson applies to this species. The language quoted from page 19 also shows that he had this species directly in mind. On the other hand in the latter part of his work Adanson says he took the name *Filix* from Fuchs. As I have already stated near the commencement of this paper Fuchs had but two species *Filix mas* and *Filix foemina*. Adanson (p. 20 and 551) treated *Filix mas* as belonging to the genus *Dryopteris* or *Druopteris*, and treated the female fern, *Filix foemina*, as belonging to his genus *Thelypteris* (p. 20 and 610), thus not leaving any of the genus as treated by Fuchs. Under this confused state of facts we will probably most nearly accord with what Adanson had in mind should we eliminate his reference to Fuchs, and treat *Filix bulbifera* as the type of a genus *Filix* Adanson. But as this name is a homonym of *Filix* Ludwig it is not to be used.

In conclusion let me refer any who object to the use of the name *Filix* at all to the words of probably the greatest authority on old botanical matters. I refer to Haller, the author among other great works of Bibliotheca Botanica, a wonderful source of information about old botanical literature.

In keeping up the name *Filix* in place of the Linnaean *Pteris* he says (Stirp. Indig. Helv. Inchoata **3**: 7. 1768).

"Retinemus antiquissimum, & celeberrimum veterum nomen, cum optima classica nomina habeamus, & Filicem vocamus stirpem ejus classis inter Europeas speciosissimum."

NEW YORK CITY

Appalachian Aspleniums

The Appalachian Aspleniums[1]

EDGAR T. WHERRY

The group of rock-inhabiting Aspleniums whose center of distribution lies in the southern Appalachian Mountains is remarkable in thriving in mediacid soils, whereas the majority of other rock-ferns prefer circumneutral (slightly acid to slightly alkaline) habitats. Some speculations as to their relationships may accordingly be worthy of record. It is here suggested that this group has originated in part by direct descent from a northern ancestor, and in part by hybridization between this and a southern ancestral stock, as brought out in the diagram,[2] plate 4. The species included have all be drawn on the same scale, mostly from actual specimens, and are reproduced about 2/5 their natural sizes; they are as follows:

1. Asplenium (Camptosorus) rhizophyllum L.[3]
2. Asplenium pinnatifidum Nutt., form with acute segments.
3. Same as 2, a more frequent and typical form.
4. **Asplenium trudelli sp. nov.**
5. **Same as 4, deeply cut form.**
6. **Asplenium montanum Willd.**
7. **Asplenium ruta-muraria L.**
8. Asplenium gravesii Maxon, in part a hybrid between 3 and 9.
9. Asplenium bradleyi D. C. Eaton, a frequent and typical form.
10. **Same as 9, a broader form.**
11. Asplenium ebenoides R. R. Scott, in part a hybrid between 1 and 14.
12. Asplenium stotleri sp. nov., in part a hybrid between 3 and 14.

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[1] Presented in abstract at the meeting of the American Fern Society, January 1, 1925.

[2] Thanks are herewith extended to Mrs. C. A. Weatherby for her kindness in preparing the drawing for this plate.

[3] *Camptosorus* is hardly more than a sub-genus of *Asplenium*.

13. A little known plant, possibly a hybrid between 9 and 14.
14. Asplenium platyneuron (L.) Oakes; 8 pairs of pinnules omitted.
15. Asplenium resiliens Kunze.

N. Northern ultimate ancestor.
C. Direct ancestor of Camptosorus.
R. Direct ancestor of Asplenium ruta-muraria, etc.
A. Direct ancestor of the Appalachian Aspleniums.
S. Southern ultimate ancestor.

NORTHERN ANCESTOR.—Judging from the features of its present-day descendants, the one ultimate ancestor of the group of ferns under consideration was thick-textured, green-rachised, and pinnately divided. The geographic distribution of these descendants suggests that it lived, prior to the Glacial Period, in far northern North America, and migrated out in various directions, developing into new types as it went, as indicated by the arrows at the top of the diagram, extending out from "N."

In the region from which many species of plants spread to both eastern North America and eastern Asia, its lobes coalesced, resulting in the entire frond-outline with network of veins characteristic of the sub-genus *Camptosorus* (indicated by C in the diagram). In the region of dispersal of plants to western North America and Europe, on the other hand, the evolution was in the opposite direction, as shown in the highly dissected *Asplenium adiantum-nigrum*. One descendant from this stock, *Asplenium ruta-muraria*, is exceptional in occurring both in Europe and *eastern* North America; but as it is so familiar to students of the latter region, it is included in the diagram. Its initial "R" has been used to designate the ancestor of this group.

All of the plants thus far discussed are circumneutral-soil species, and undoubtedly their ancestors showed in

the main similar preferences. But there was evidently another offshoot from the ultimate ancestor which developed in a region from which plants could migrate into the southern Appalachians, and which became so changed in physiology as to prefer rather highly acid soils; this is marked in the diagram by an A, which may be taken as an abbreviation either of acid or of Appalachian (or both). It was from this stock that the species shown in the upper and interior part of the diagram are believed to have been largely derived.

The coming of the Glacial Period resulted in the extermination of the northern ancestors and no doubt many of their descendants, but such of these as chanced to migrate south of the ice limits have been preserved to the present day.

DESCENDANTS OF ACID-SOIL ANCESTOR.—The Lobed Spleenwort, *Asplenium pinnatifidum*, is a markedly variable species, but only two of its forms have been introduced here; though most typically pinnatifid with rounded divisions (fig. 3), it sometimes develops acute segment-tips, as in specimens from Key's Ferry, Jefferson County, West Virginia (fig. 2), and again tends to become sub-pinnate at the base. The latter mode of variation occasionally proceeds to such an extent that the resulting plant is entirely different in aspect from *A. pinnatifidum* proper, being in fact equally close to *A. montanum*, and running down in the average key to the latter, so that its description as an independent species seems justified:

Asplenium trudelli sp. nov.—Figures 4 and 5, plate I. Not heretofore distinguished from *A. pinnatifidum*, but differing in being pinnate through about half its length, the deltoid-ovate to ovate-lanceolate pinnules being rather widely spaced and slender-stalked, with their mar-

gins sharply toothed or even pinnatifid, ranging between the extremes shown in the two figures. Rachis green, slender below, winged above; stipe green, except at its point of attachment to the rootstock, where brown. Veining and pale brown sori as in typical *A. pinnatifidum* and *A. montanum*. Possibly in part the result of hybridization between these species, but considered to be chiefly another descendant from their common ancestor (A in diagram). It is abundant and obviously self-perpetuating in the region where it has been studied.

As type specimen may be designated one collected by Harry W. Trudell, of Philadelphia, and the writer in July, 1920, growing in mediacid soil on quartzose mica-schist ledges on the south side of the ravine at Cully, just below the McCall's Ferry dam across the Susquehanna River, in Lancaster County, Pennsylvania, several fronds from which have been deposited in the U. S. National Herbarium. Previous collections of the same plant are represented in the herbarium of the Academy of Natural Sciences of Philadelphia and elsewhere, the chief localities being York Furnace, across the river from the above mentioned locality, and islands nearby; also Harpers Ferry, West Virginia, and Winston Co., Alabama (Herb. N. Y. Bot. Gard.). It is, moreover, figured at the upper right hand side of the plate of *A. pinnatifidum* in Waters' Ferns, reproduced in Tilton's Fern-lovers' Companion.

The Mountain Spleenwort, *Asplenium montanum* (fig. 6), is likewise rather variable in outline, but for the purpose of the present discussion only a single average frond has been figured. It is regarded as forming, with the two preceding species, a closely related group; which of the three is nearest to the ancestral type can not be decided. The Wall-rue Spleenwort, *A. ruta-muraria* (fig.

7), although grouped with it in many treatments of the *Asplenium*s, is here regarded as more remotely related, as the diagram brings out.

SOUTHERN ANCESTORS.—The thin-textured dark-rachised simply pinnate stock of tropical and subtropical regions has evidently also contributed to the Appalachian *Asplenium* assemblage. One of its descendants which reaches as far as Virginia is the Dark-stem Spleenwort, *Asplenium resiliens* (fig. 15); this is characterized by its opposite pinnules, dark brown sori, and preference for circumneutral, calcareous soil. The Ebony or Stiff Spleenwort, *A. platyneuron* (fig. 14), has mostly alternate pinnules, paler brown rachis and sori, and is apparently indifferent as to soil reaction, thriving luxuriantly in acid decaying wood on the southern Coastal Plain, but also occupying limestone ledges, where the soil is often slightly alkaline. The descendants from this stock show marked ability to hybridize with those from the northern stock already discussed, and most of the rest of the species herein treated give evidence of such hybrid origin, even if remote.

HYBRIDS OF NORTHERN AND SOUTHERN STOCKS.—The best known intermediate between the northern and southern groups is *Asplenium ebenoides* (fig. 11). This usually has the lower half of its rachis brown, like its southern parent, *A. platyneuron*, and suggests a double row of little fronds of *Camptosorus* ranged along this rachis. The fact that it has been produced artificially clearly indicates its hybrid origin, yet it is well-known to have become fertile and self-perpetuating in Alabama, and Mr. Harold W. Pretz has called the writer's attention to the same phenomenon in Lehigh County, Pennsylvania, so that it may be regarded as having attained the status of an independent species.

In the Fall of 1923 several members of the Wild Flower Preservation Society, Washington D. C. Chapter, took a trip to Harpers Ferry, West Virginia, and were guided by Dr. T. C. Stotler, an amateur botanist of that place, to some rock ledges along the Shenandoah River above Keys' Ferry, where he had noted the occurrence of various rock ferns. In addition to our finding of several forms of *Asplenium pinnatifidum*, a small plant of another type of *Asplenium* was noticed by Mrs. T. M. Knappen, and brought to the writer for identification. This was recorded as possibly *A. gravesii* in an article on the ferns of eastern West Virginia,[4] but a recent visit to the locality has led to a new interpretation of it, so that it may here be described as:

Asplenium stotleri sp. nov.—Fig. 12. Somewhat resembling *A. gravesii* and *A. bradleyi*, but differing in having the margins rounded instead of sharply toothed, and in the sori being lighter in color. Fronds reaching a maximum length of 20 centimeters, varying in outline from oblong to ovate-lanceolate, decidedly contracted toward the base, and pinnate with widely spaced alternate to opposite sub-sessile pinnules. Individual pinnules cut into rounded segments, and suggesting tiny fronds of *A. pinnatifidum* ranged along the rachis (cf. *A. ebenoides*). Rachis slender below, brown for 1/3 to 1/2 its length, broader and green above. Stipe brown and shining. Sori rather light brown, as in *A. pinnatifidum* and *A. platyneuron*, between which it is clearly an intermediate, and presumably at least originally a hybrid.

The type specimen was collected by Dr. T. C. Stotler and the writer in mediacid soil on quartzose mica-schist ledges just above Keys' Ferry on the Shenandoah River,

[4] *Am. Fern J.*, 13, 104, 1923.

Jefferson County, West Virginia, in November, 1924, and deposited in the U. S. National Herbarium. The plant is limited to a single cliff, about 20 meters high, but grows at various levels there, apart from any other fern, its presumed parents occurring on adjoining cliffs a few meters away. Young plants are coming up on various ledges upon this cliff, indicating that it, like *A. ebenoides*, has also become fertile and self-perpetuating, and so worthy of classification as an independent species.

The variable species known as *Asplenium bradleyi* shows relationships to both northern and southern groups in cutting, rachis, and texture, but does not seem to have resulted from the hybridization of any existing species. Its stipe and lower rachis, as well as its sori, are usually rather dark brown in color, indicating a relationship to *A. resiliens*, but its alternate pinnules and sharply toothed margins are more suggestive of *A. platyneuron*, so its southern parent may well have been an acid-soil intermediate between these, now extinct. Its broad base, deep cutting, and thick green-rachised terminal portion might have arisen from any of the three northern Appalachian *Asplenium*s already discussed, or from some other member of that group which has not survived. It is therefore regarded, and shown in the diagram, as a descendant from a hybrid of undesignated members of the northern and southern stocks. Figure 9 shows its most typical form, and 10 a broad-based variant, but several other types could have been introduced.

Asplenium gravesii (fig. 8) shows characters in every respect intermediate between *A. bradleyi* and *A. pinnatifidum*, and may well have originated as a hybrid between them; but in its colonies on the lower Susquehanna River, in Pennsylvania, at least, numerous small plants are coming up along the same cliffs on which the older

ones are growing, bearing evidence to its having become fertile and self-perpetuating, as have the other hybrids here described.

Finally, in the herbarium of the Academy of Natural Sciences of Philadelphia there is a sheet of four plants of what appears to be an intermediate between *A. bradleyi* and *A. platyneuron*, a frond from one of which is here shown in figure 13. As this has not as yet been studied in the field by the writer, nothing further will be said about its relationships at this time.

SUMMARY.—Four Appalachian *Aspleniums* have been previously known, and two new ones are here described. Three are regarded as descendants of a northern ancestor, and one of a hybrid between now unknown northern and southern parents, while two are indicated to be hybrids of present-day species, which have however become fertile and self-perpetuating, and are to be classed as independent species.

WASHINGTON, D. C.

New Tropical American Ferns--II[1]

WILLIAM R. MAXON

The present instalment contains descriptions of two new tree ferns. One of these is a diminutive *Alsophila* from British Guiana, belonging to a group of half a dozen South American species characterized by having the fronds once-pinnate and pinnatifid, resembling certain species of *Dryopteris*. The other is a Porto Rican *Alsophila* which shows extraordinary range of leaf dissection, fully fertile fronds varying from pinnate-pinnatifid to bipinnate-pinnatifid.

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[1] Published by permission of the Secretary of the Smithsonian Institution.

Alsophila Gleasoni Maxon, sp. nov.

Rhizome undescribed, presumably small and forming a short erect caudex; fronds 65 cm. long; stipe 20 cm. long, slender (2–4 mm. thick above the base), castaneous, armed with scattered blunt straight conical spines less than 1 mm. long, deciduously paleaceous, the basal scales linear-deltoid, long-attenuate from a subcordate base, 5–6 mm. long, bright brown, with narrow, pale, minutely erose-denticulate margins, those above striped, with broad, pale, subfimbriate margins; blades linear-oblong, 45 cm. long, 10–14 cm. broad, long-acuminate in the apical third (the tip attenuate-caudate), pinnate-pinnatifid, the rachis distantly aculeolate toward the base, brown, nonpaleaceous, laxly puberulous; pinnae about 20 pairs, alternate, spreading, approximate, oblong, rounded below (the proximal segment short), abruptly acutish or even obtuse at the apex, 5–7.5 cm. long, 1.5–2.2 cm. broad, petiolulate (1 mm. or less), pinnatisect at base, less deeply cut outward, the costa yellowish-strigose above, bearing a few scattered hairs beneath and an occasional bullate dark brown scale; segments of lower pinnae 10 or 11 pairs, oblong, rounded, distally acutish, subfalcate, 4–5 mm. broad near the apex, the basal 2 or 3 pairs half or two-thirds their width apart, somewhat constricted at base, joined by a long, very narrow wing, subentire to deeply crenate-serrate, those above closer, abruptly decurrent, the wing gradually broader; costule bearing 2 or 3 spinous hairs above, glandular-strigillose beneath; veins 6 or 7 pairs, very oblique, obscurely glandular-strigillose beneath, mostly once-forked; sori small, slightly supramedial, borne upon one or both branches, mostly in the basal half of the segment; receptacle very small, subglobose; paraphyses minute. Leaf tissue herbaceous, dull green, paler beneath.

Type in the U. S. National Herbarium, no. 1,059,473, collected near Rockstone, British Guiana, in dense upland forest, July 15 to August 1, 1921, by H. A. Gleason (no. 830).

A most distinct new member of the small group of pinnate-pinnatifid species of *Alsophila*. From a reading

of the published description of *A. bipinnatifidum* Baker, founded on a British Guiana plant collected by Appun (no. 1032), it might be confused with that species; but a portion of the Appun type, courteously forwarded from Kew, shows that *A. bipinnatifidum* differs in nearly all respects, more especially in its narrower and much longer pinnae (10 to 13 cm.), its more numerous, evenly rounded, and membranous segments (about 19 pairs), its conspicuously hairy surfaces (the hairs of two kinds, short and long, borne freely upon the costules, veins, and leaf tissue on both sides quite to the ciliate margins), its more numerous veins, and its distinctly inframedial sori. The relationship of *A. Gleasoni* with the other members of the group is even more remote.

Alsophila borinquena Maxon, sp. nov.

Rhizome decumbent, 10–30 cm. long, or erect, up to 1 meter high, densely paleaceous at apex, the scales ovate-attenuate, 1–1.5 cm. long, light castaneous, concolorous, lustrous. Fronds several, 1–2 meters long, the stipes olivaceous, distantly muricate or low-aculeolate at base; blades oblong-ovate, 0.5–1.5 meters long, the smaller ones pinnate-pinnatifid only, the larger bipinnate-pinnatifid, the rachis dull olivaceous, smooth, glabrescent; pinnae spreading, stalked, articulate, those of small but fully fertile blades 10–16 cm. long, 2–5 cm. broad, narrowly lance-oblong, long-acuminate, merely pinnatifid to pinnatisect, the segments close, mostly falcate, serrate-crenate, with a single or double row of sori; pinnae of large fronds deltoid-oblong, acuminate, 30–45 cm. long, 15–20 cm. broad, long-stalked (3–5 cm.), pinnate-pinnatifid, the rachis pale olivaceous, unarmed, bearing about 12 pairs of distant pinnules, these stalked, articulate, linear-oblong, long-acuminate, pinnatifid more than half-way to the elevated costa; segments oblong, close, broadly joined, slightly serrate-crenate at apex, the costule bearing 1 or 2 minute, deciduous, light castaneous, ovate-attenuate, bullate scales; veins 7–10 pairs, elevated,

simple or some of the proximal ones acutely forked; sori 6–9 pairs, small, the lower ones supramedial, the others nearly medial; paraphyses short, hyaline; indusial scale wanting. Leaf tissue spongiose-herbaceous or subcoriaceous, lustrous, glabrous.

Type in the U. S. National Herbarium, no. 1,145,551, collected in forest along the Catalina-Yunque Trail, Luquillo Mountains, Porto Rico, at 600 meters altitude, February 23–26, 1923, by N. L. Britton and E. M. Bruner (no. 7571).

The present species is common in Porto Rico, particularly in the Sierra Luquillo, the following additional specimens being at hand: *Britton & Brown* 5441; *Britton & Hess* 2274, 2316; *Cowles* 416; *Dale* 31, 62; *Eggers* 1179, 1223; *Heller* 706, 1075; *Hess* 361; *Johnston* 758; *Shafer* 3230, 3339, 3520, 3613; *Sintenis* 1754, 2588, 4688, 6146; *Underwood & Griggs* 327. The Sintenis numbers were wrongly identified by Kuhn, partly as *A. nitida* Kunze (a species of the Lesser Antilles), partly as *A. gibbosa* Klotzsch, which apparently is restricted to South America. All three species belong to the difficult group of *A. aspera* (L.) R. Br., which will be discussed in a later paper.

WASHINGTON, D. C.

Ferns-Facts and Fancies About Them-V

F. E. CORNE

Botanists have arranged the great order Filices, or Ferns, into suborders, families, genera, species, varieties and forms. The eight families are distinguished by the way in which the tiny globes (called sporangia) inclosing the dust-like spore atoms burst open to discharge their contents. In the family called Polypodiaceae, to which most of our ferns belong, these globes, themselves as

small as little seeds, are stalked, are somewhat the shape of a helmet and are encircled by an elastic jointed ring which is weak at one spot. When the spores are ripe the ring shrinks, the weak spot cracks, gapes open as the spore case breaks, the upper part bends back suddenly and closes again thus scattering the contents to the wind.

On examining groups of sporangia by the aid of a good pocket lens it is seen that each group is formed of a number of these globes and that they each grow out from a vein either at the tip or from the sides, also that they are in most of our species covered by a thin papery shield. This covering is a raised bit of the epidermis and is called the indusium. The manner in which this indusium is attached, at the center or the side, and the way in which it opens is so unvarying that it is used by botanists as a means of deciding genera. The group containing the polypodies and beech ferns has no indusium and has been said to have "naked spores" although, as the spores are still in cases, that would seem to be rather a misnomer.

This part of fern study is very intricate, but fortunately we, as beginners, need not trouble ourselves much about it. What we must know, however, is the shapes of the different groups, and their positions on the fronds. As we have seen they may be round, curved or elongated, near the margin, or in rows near the midvein, or half way beneath, or under the recurved edge of the pinnules, and so on. Under a modern microscope the tiny spore atoms, whose presence was not even known to ancient botanists, are seen to be translucent objects consisting of a single cell of various shapes, round, oval, tetrahedral, etc., according to the different species, and some of them are beautifully marked.

Two hundred years ago the presence of these spores was discovered, but they were supposed to be seeds.

Seeds, as every one knows, produce tiny plants like the parent plant, but spores produce plants quite unlike the parent. In the case of ferns these are like small green heart-shaped scales which, when mature, are not more than a quarter of an inch across, are attached to the ground by tiny hairs and are called "prothallia."

In all cases, large ferns or small, these are essentially the same. On the under side of these tiny plants, when fully grown, can be seen by the aid of a microscope two groups of excrescences, which are essentially the flowers of the ferns, and which contain the reproductive organs. When ripe there issues from one group tiny coiled-up objects which, as if endowed with sense, swim over to the others in a drop or dew or other necessary moisture and fertilize them as the pollen of flowers fertilizes the pistils. An infinitesimal root stalk now begins to grow, a hair-like root goes down into the earth, a tiny leaf appears above and a baby fern has started on its perilous career. The prothallium lives until the little fern can take care of itself then withers and disappears. And now with suitable conditions, if nothing untoward happens, like lack of moisture, or the attack of insects, or perhaps being crushed or uprooted by some careless person, in the course of from two to seven years, according to species, the little fern will grow to maturity. Surely when one knows the length of time required for a fern to attain its full growth one will not only be careful oneself but will also warn others against unnecessary or careless uprooting of a fern plant. A well-established fern in congenial surroundings will live for very many years.

Another way of identifying the species is by the veins which can easily be seen by holding a frond up to the light. Many ferns, superficially alike, can be identified in this way. For instance, the sterile fronds of the cin-

namon and interrupted osmundas, the ostrich fern and even sometimes the Virginian chain fern, if found in uncongenial surroundings like a dry sunny field where they have survived after trees have disappeared, are apt to be stunted and look much alike even to an expert. But the ostrich fern has perfectly simple veins running in straight parallel lines from the midvein to the edge of the leaf. The two osmundas have also parallel veins near the midrib, but they divide and fork before reaching the edge, while the chain fern has meshed veins like a net. Of course if fertile fronds are present, not likely however under such conditions, there should be no difficulty.

Still another means of identification is found in the stems which show a great diversity in form, color, and texture. The maiden hair, for instance, has round glossy almost black stems, while the hay-scented dicksonia has green ones shading to yellow or red toward the rootstock and covered all over with tiny downy hairs to which fact is owing the old technical name of "pilosiuscula." Again the prickly shield fern is thickly covered with brown scales all the way up the stipe. The marginal shield fern has large bunches of bright brown scales growing close to the caudex. Then some are round, some flat, some grooved on the sides or front or both. Dr. Waters, author of a beautifully illustrated fern book, can tell to what species a fern belongs by simply cutting a cross section of the stem and noting the number and arrangement of the fibro-vascular bundles. These bundles are fibers which run through the stems to the ends of the fronds forming the veins there and which act like sinews to the plant.

I can of course only indicate these differences. The best and quickest way to learn the different species is by gathering fresh fronds, taking care to secure both

sterile and fertile ones, and then looking them up by means of a key or descriptive book of which there are now several on the market. This is not so difficult as may be imagined, that is, so long as one keeps to our ordinary New England species, the first of course that one wants to get acquainted with. And if one happens to find a plant that is unusually puzzling, why fern students are a friendly group, almost any one of whom would doubtless be glad to come to your aid. But be sure for the first to secure a popular fully illustrated book as free as possible from obscure technical phrases.

I began, as already said, with Mrs. Parsons' "How to Know the Ferns," now to be found in almost every library. It is a delightful book to read. Her descriptions are charming and she takes one with her on her trips to search for her treasures, in the forest, beside running waters, on the sides of steep cliffs and rushing mountain torrents. But for quick identification one or two of the more recent books are more satisfactory, because while equally elementary, they go more directly to the point, describe more species, and are small enough to carry in the pocket. To Mrs. Parsons is due, if I am not mistaken, the credit of the first really popular book on northeastern ferns, all previous ones which were at all attractive for beginners were, to say the least, prohibitive in price besides being too large and heavy to handle easily.

Another interesting thing about ferns is the many ways they can be propagated—not only by spores. running rhizomes, and divided crowns but some. like our Boston fern, throw out stolons which root if covered with earth. Others, like the walking fern, bend their long tips over until they reach the ground where they take root starting new plants. Still others have tiny plant-

lets growing out of the upper surface of the fronds which will grow separately when properly detached and planted. Still others bear bulbils, some on the rachis, or fern leaf stem, and some even on the roots. Besides this, florists can do wonderful things to multiply plants. Among others they understand how to cut up fronds of the hart's-tongue fern and by planting the pieces produce new plants, much, I suppose, as one plants a begonia leaf.

The spores of most ferns, though so very tiny, possess a wonderful vitality. I have read of lost species being regained by planting spores of specimens that had been in press for many years. On account of this remarkable vitality some facetious writer suggests that our ferns might be the means of starting vegetation on some new planet. Their spores are so small and light that they might be caught up and carried by the wind beyond our atmosphere and being then in cold storage, as it were, could travel on and on for years until attracted by some new planet on which they would alight and there begin to grow.

CAMBRIDGE, MASS.

Recent Fern Literature

M. Henri Gadeau de Kerville has generously presented to the Society, in a finely printed and beautifully illustrated pamphlet of 66 pages, the second series of his "Notes sur les Fougères" (Notes on Ferns), nos. 6 to 11, inclusive;[1] and they may now be borrowed by any member who is interested and can read French. M. Gadeau de Kerville is especially interested in "freak" forms, their nature and origin. He has investigated the

[1] For a review of the first series, see this Journal 8: 23, 1918.

cause of abnormal forking in ferns, finding it to be physiological. He has described semi-fertile fronds of *Blechnum Spicant*, intermediate between normal fertile and normal sterile forms, which he thinks are nearly like the fronds of an original monomorphic ancestor of the species. From the fact that the simply pinnate *Blechnum Spicant*, like our own Christmas fern, sometimes produces fronds in which the lowest pair of pinnae are pinnatifid while the others remain simple, he argues that species like *Polystichum tripteron* Kze., in which such a condition is now normal, were originally of teratological origin. He has tested the taxonomic value of some, often much-named, varieties. He found deeply cut, forked, and crested fronds of *Asplenium Nidus* and *A. Hemionitis* on the same rootstocks with normal ones. He produced marked variation in leaf-form in plants of *Polystichum aculeatum* by exposing them to alternate periods of heat and cold. By transplanting specimens of *Pteridium aquilinum*, f. *undulatum* Bréb. (a variant recognized in many European floras) to a sunny place in his garden, he got perfect fronds of the typical form from the same rootstocks which the year before had been producing the variant. From these facts he concludes that such variations are of no importance in classification and protests earnestly against giving them scientific names.[2]

Carl Christensen has determined the pteridophyta among the Chinese plants collected by Dr. Harry Smith during the years 1921 and 1922. The results he has now published in the form of three lists, one of 31 species from the province of Chili, one of 9 from Yunnan, and,

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[2] Gadeau de Kerville, Henri. Notes sur les Fougères, sixieme-onzieme. Pp. 255–321, pls. 7, figs. 16. Rouen, 1922.

third and most important, an enumeration of all the fern-worts hitherto reported from Sze-chuan. This includes 320 species; but Mr. Christensen believes that too many species have been described from China in recent years and that this total will be considerably reduced by further study. He has himself been able to see the types of a number of species rather vaguely described by J. G. Baker and Christ and has reduced a large proportion of them, especially of Christ's, to synonymy. This definite disposal of hitherto doubtful plants is one of the most valuable features of the present work.

Three species not before known from China, *Dryopteris stegnogramme*, *Cystopteris montana*, and *Equisetum variegatum*, are recorded. Six new species, in *Woodsia*, *Asplenium*, *Dryopteris*, *Pellaea*, and *Cheilanthes*, are described and illustrated.[3]

J. A. Crawford has described the collection of hardy ferns in the New York Botanical Garden. It is placed on the east and north sides of a large outcrop of native rock, shaded by good-sized trees. A miniature brook has been made to flow down from the summit of the rock. In the moist terraces along its course and the artificial bog which it waters and on the rock itself, some of whose crevices have been filled with limestone for the sake of such species as like it, are growing 34 native ferns (including climbing fern, two grape ferns, Scott's spleenwort, and the slender and purple cliff-brakes) and three exotics from Japan and South America.[4]

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[3] Christensen, Carl. Plantae sinenses a Dre. H. Smith annis 1921–22 lectae. III. Pteridophyta. Medd. Göteborgs Bot. Trädg. I, 41–110, pls. 16–20. 27 Oct., 1924.

[4] Crawford, J. A. Hardy Ferns. Journ. N. Y. Bot. Gard. 24: 114–119. June, 1923.

Prof. H. S. Conard believes that for every floristic district of his state (Iowa) there should be a "simple and convenient manual of the local flora." Toward this end he has prepared a comprehensive little manual of the pteridophytes of the vicinity of Grinnell. It gives brief descriptions of the larger groups, genera, and species, and keys to the last where a genus contains more than one. Derivation of generic names, habitats, local stations, common names, general ranges, and time of fruiting of species are recorded, as well as occasional notes containing miscellaneous information. Some of the evidently local common names are interesting, as "snake grass" for *Equisetum laevigatum* and "prairie fern" for *Cystopteris fragilis*. We do not think, however, that we shall follow Prof. Conard in referring to the walking fern as "root-leaf Camptosorus." Nor do we think that Grinnell is likely to become a mecca for fern lovers. Its entire fern census includes only five fern allies, one grape fern and 18 true ferns, and of this total of 24, 16 are reported as rare.[5]

All fern-lovers should be interested in the following clipping from a Syracuse, N. Y., newspaper:—

"The Solvay Process Company has notified botanists connected with Syracuse University that due notice will be given before ferns on the tract of land between Jamesville and High Bridge, which it is now working, are destroyed by quarry operations."

The ferns referred to are, of course, hart's-tongue. Eventually, the company expects to remove all vegetation from the tract, but its action in giving notice to in-

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[5] Conard, H. S. A manual of the ferns and "fern allies" of Grinnell and vicinity. Proc. Iowa Acad. Sci. 29: 317–327, 1922 (so dated, but apparently not actually issued in that year).

terested botanists makes it possible to save the hart's-tongue by transplanting.

NOTE ON ABNORMAL FRUITING IN THE CINNAMON FERN. —As I was walking along the edge of a shaded swamp near Gainesville, Florida, early in February, 1925, I saw a solitary frond of *Osmunda cinnamomea* that looked peculiar, so I stopped to examine it more closely. It was three feet tall and mostly sterile and normal except at the tip, where it was contracted and fertile for about six inches, the apical pinnules being a mass of sporangia and those lower down bearing sporangia only around their margins. Other plants of this species had sent up their fertile fronds a month ago and the last sterile ones were just unrolling. The curtain was being rung down on the season—the last chance to play a part in the next generation was rapidly slipping away; but the elemental urge to reproduce was active in this solitary frond, the only one of its clump, and when its final pinnules were unrolled, behold something different—sporangia filled with spores! This was not a fertile frond with sterile parts—*forma frondosa*; but a sterile frond with fertile parts—*forma fertilis.*

I find much to interest me in the Florida ferns.—W. A. MURRILL, *Gainesville, Florida.*

Dr. Murrill's note on the cinnamon fern has a number of interesting implications—for example, the fact that, even in Florida, fertile fronds had completed their development at the early date specified. Of much interest is the observation that the "frondosa" forms, in which part of the frond is sterile and part fertile, may arise in two ways—by a normally fertile frond producing sterile pinnae, and the reverse. In the former, one would ex-

pect the sterile part of the frond to be at the tip, in the latter, at the base, as in Dr. Murrill's specimen. Can anyone tell us anything about the relative frequency of the two arrangements, and whether there is any tendency for one to appear earlier in the season than the other?

American Fern Society

The Massachusetts Horticultural Society has awarded a gold medal to our new member, Mr. H. H. Richardson, for "his work in creating a remarkable wild garden" and a first-class certificate to Mr. E. H. Clarkson for "his work in collecting, classifying, and cultivating native ferns."

Plans are on foot for a local field meeting of Fern Society members at Monterey, Berkshire County, Mass., at some date in July, a project made possible by the interest of Mrs. Anna C. Parker. The region within reach of Monterey offers a considerable variety of soils and habitats; it should be easy to see a large number of fern species in their native haunts. Notices giving details will be sent later to members living conveniently near; anyone interested may get full information by applying to E. J. Winslow, 222 Grove St., Auburndale, Mass., or to C. A. Weatherby, 11 Wells Ave., East Hartford, Conn.

Miss Mary Alice Marshall, a member of the Society since 1906 and its Vice-president from 1920 to 1924, inclusive, died in Cambridge, Mass., March 29, 1925. Miss Marshall's home from early childhood was in the village of Still River, a part of the town of Harvard, Mass. It was a stimulating atmosphere in which she grew up,

where the parents were alive to all beauty in nature and to the best thought of their time; where books and flowers abounded and a compound microscope stood ready for use; and where children were trained to observe carefully and describe accurately what they saw.

After her schooling was over, she spent a few years in teaching, and later was a proof-reader in the office of the Manchester, N. H., *Mirror*. This work she left because of her mother's failing health, and for many years was kept at the old home, caring for both parents. Always she studied the life of the fields and woods within her reach; and she was a good gardener. But what those who knew her will remember, more than what she did, is that she was the finest, sanest, most loyal friend, and that Emerson's phrase about one "who in the midst of the crowd keeps with perfect sweetness the independence of solitude" seemed made for her.

Miss Marshall's herbarium, consisting largely of local ferns collected by herself and containing the interesting specimens of proliferous ebony spleenwort from the basement of a school building which she once described in the JOURNAL, was bequeathed by her to the Society.

Changes of address:

Kittredge, Miss E. M., Box 352, Berlin, N. Y.

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R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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A regular loan department is maintained in connection with the Society herbarium. Members may borrow specimens from it at any time, the borrower paying all postal or express charges. The pages of the Journal are also open to members who wish to arrange exchanges; a membership list is published to further assist those interested in obtaining specimens from different localities.

Pteris longifolia and Adiantum tenerum growing at the Base of a partially shaded Cliff, "La Grande Source," Étroit, Gonave Island

American Fern Journal

Vol. 15 JULY–SEPT., 1925 No. 3

Fern Collecting in Haiti.[1]—I

E. C. Leonard

Imagine my surprise and excitement when told, on returning to the National Museum from military service in the fall of 1919, that I was to have the opportunity of collecting plants in Haiti, a region in which little work of this nature had been done. It was suggested that I accompany Dr. W. L. Abbott, of Philadelphia, a naturalist old in travel and experience, who wanted particularly to study the bird life of Gonave Island and to complete certain series he had collected on a former visit. Dr. Abbott, I might add, has long been a benefactor of the United States National Museum. His chief interest is in ornithology, but aside from birds he has made extensive collections of mammals, as well as of ethnological material, chiefly in Africa, Tibet, the East Indies, and Hispaniola. The present opportunity was for me the chance of a lifetime! I did not even consider the possible difficulties, but set about at once to make the necessary preparations.

Thus, one cold day in February, 1920, I found myself actually en route for New York to meet Dr. Abbott, on the way to Haiti. There had been a severe storm in the

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[1] Published by permission of the Secretary of the Smithsonian Institution.

Northeast. The streets of the city, buried in snow to a depth of several feet, were completely obstructed in many places, and vehicles were forced to run on the sidewalks, which for the most part had been kept clear. Fortunately we had sent on our heavy baggage ahead of time. As it was, we experienced a good deal of trouble in reaching the wharf with our hand bags. Three days later found us passing through the warm Caribbean on the S. S. Colon, with the cold and snow of New York far behind. On the evening of the following day the blue ranges of the northern peninsula of Haiti, close to our left, and the damp woody smell of the land breeze blowing off the Cul-de-Sac both told us we were nearing port. Next morning we were walking the hot white streets of Port-au-Prince, the capital of Haiti.

PORT-AU-PRINCE

To those who know Port-au-Prince the place is always associated with the great twin-towered cathedral that rises in its midst far above all other structures. The city itself, especially the older part, is built on French plans; the sidewalks are at any height, and unless you are especially active it is greatly to your advantage to walk in the street. This seems to be expected, however, as the sidewalks are mostly used for displaying wares and country produce. Notwithstanding the encroachments of the ubiquitous flivver and the abounding traffic of a single short street car line, the rickety carriage with its clanging bell and equally rickety steed still plays a great part in the transportation of passengers. Pretentious suburban residences, analogous to the French châteaus, are beautifully hidden in walled gardens filled with tall palms, brilliant bougainvilleas, sabliers (*Hura crepitans*), and many other showy plants.

SKETCH MAP OF HAITI, SHOWING THE LOCALITIES VISITED

The climate of Port-au-Prince, cooled by the land breeze at night and somewhat tempered by a sea breeze during the day, is not unpleasant. Early each morning the streets are swept by the white-clad Département Sanitaire, and for neatness they put to shame many of our American cities. In the heat of mid-day, aside from the "clack-clack-clack" of an occasional coffee fan, a drowsy quietness pervades the streets, but toward evening they awaken to business and the liveliness of pleasure-bent citizens.

We selected for headquarters the Hôtel de France, on account of its nearness to the wharf and railroad stations. As Dr. Abbott took over the responsibility of obtaining permits and arranging baggage for our first inland trip, I was left with some spare time. Of this I took advantage by making small excursions about the city for plants.

South of the wharf and near the seashore were several vacant lots and unused grassy streets. The ground, intersected by ditches, was marshy in places and mostly covered by a sod of grasses, sedges, and various tropical weeds. The only ferns found here were a few large plants of *Acrostichum excelsum*.

Bordering the city on the south are low foothills, cut by dry rocky ravines. The slopes are arid, rather steep, and generally covered with thickets. Here *Cheilanthes microphylla* was occasional. *Adiantum melanoleucum* grew abundantly on low limestone cliffs exposed by road-grading; this, *A. tenerum*, *Dryopteris serra*, and *Pteris longifolia* were found commonly also in the dry ravines.

St. Marc

On the 24th of February we began the first stage of our trip inland, boarding a train early in the morning for St. Marc. The entire day was required to reach our

destination, 60 miles away, and darkness overtook us long before the train finally stopped for the last time. A large crowd of natives were gathered at the station to meet us. In the scramble for baggage an over-solicitous individual shattered the baggage-master's only lantern. Then in the darkness and confusion that followed the whole crowd of spectators seemed to join in with the passengers to unload the baggage car. Eventually we were able to rescue our belongings and, with the help of two husky natives, convey them safely to the hotel.

From the viewpoint of a fern collector this region proved rather uninteresting. *Notholaena trichomanoides pilosa*, an ally of our southwestern *N. sinuata*, was occasional on the dry rocky slope rising abruptly from the seashore at the north side of the city. *Dryopteris normalis* and *D. patens* were common along irrigation ditches.

GONAVE ISLAND

Anse à Galets, a small bay on the northeastern coast of Gonave Island, was our first objective. After a few days at St. Marc, we set sail in a fishing boat, with a crew of captain, mate, and cook. Our craft was a small open affair, with a single triangular sail both ragged and patched, bearing the trademarks of several well-known American flour companies. A new chum, as Dr. Abbott calls an initiate in tropical exploration, might wonder with good cause how such a craft could keep afloat, especially in the rough water often whipped up by stiff breezes in the bay, but somehow we managed to cover the 40 miles in safety. Once on shore we pitched our first camp under a clump of lignum vitae trees not far from the small village of Anse à Galets.

Gonave Island is about 30 miles long and 10 miles wide, and consists of a low mountain range bordered

by a belt of foothills. On its north coast these merge gradually to a level beach, fringed by mangroves, and a reef-enclosed belt of still water, but on the south side they descend rather abruptly into deep sea. Interspersed among the white barren "salines" of the coast region are groups of small trees belonging to the Combretum family (*Conocarpus erectus*) and thorny mesquite (*Prosopis juliflora*); the flat bushy tops of the latter, viewed from a distance, look remarkably like a green meadow. The *Conocarpus* trees, singular in their resemblance to apple trees, give the effect of old orchards along the beach. Dense thickets cover the arid mountain sides and foothills, and the upland, called "La Table," opens into large grassy tracts with occasional trees or shrubs. The broken forest yields a fair amount of lignum vitae and logwood. Scarcity of water and, in many places, large outcrops of bare coral rock restrict agricultural activities chiefly to the few valleys containing streams, but the grassy uplands, freshened by heavy dews, furnish excellent grazing land. Apparently only goats are utilized for dairy purposes, and that on a small scale; the live stock is raised chiefly for meat.

The Haitian farmers grow their crops in clearings or "jardins." With their machetes they laboriously clear the ground of trees and most of the underbrush, which after drying is burned. Then sweet potatoes and corn are planted in the ash and thin soil, and usually are left to take care of themselves until harvest. Cotton, cassava, castor beans, and "pois congo" (*Cajanus indicus*), a bean-bearing shrub, grow more or less spontaneously. The farming equipment is in no way elaborate, consisting of a machete and occasionally a hoe. Other arts and industries are equally primitive. This was illustrated in the valley of Anse à Galets, where men were getting out lumber to build a flour mill. The large logs

were supported on an elevated platform and with the aid of a wedge the men, one above and one below, would slowly work a badly worn saw through the hard wood. Boards could be produced by this method at a rate of one every two or three days.

Sawed lumber, however, is not used in the construction of the simple one- or two-roomed, gabled structures—the average Haitian house. Usually, upright poles are first planted in the ground and on these plates and rafters are set, the whole then being fastened together by wooden pins or tough vines. Afterward the walls are filled in with a wicker-work of twigs, which is finally plastered inside and out with a mixture of mud and lime. The roof is covered with thick grass thatch. On account of neglect to employ diagonal braces the houses often acquire a considerable list. Windows are absent, as a rule, because the Haitians seem not to consider ventilation beneficial, and prefer being hermetically sealed in during the night, possibly as a protection against mosquitoes or a fancied ill effect of the night air.

Aside from occasional officials, white men are seldom seen on Gonave Island; consequently the natives have things pretty much their own way. As a rule we were met with an effuse politeness—a low bow, a lifted hat, and a pleasant "Bon jour, monsieur"; but sometimes a woman or child in the Table region would become hysterical and rush away screaming "Blanc! Blanc!" Dr. Abbott, much respected on account of his tall commanding appearance, they called "Papa." Of course, even in our own highly civilized country the ways of a naturalist are sometimes incomprehensible, but here a plant collector could mean only one thing, namely, "boco," or gathering herbs for medicine or magic. It was useless to tell them otherwise.

The Haitians, where undisturbed, are still supposed to carry on their old voodoo rites. An opportunity was

offered me on Gonave Island to verify this fact, but unarmed and alone I did not think it prudent to investigate too thoroughly these ceremonies, which are generally reported to be rather dangerous for an unescorted visitor. However, while covering some new territory on "La Table," my attention was attracted by a distant continuous roll of tom-toms, with occasional yells. Working slowly toward the sound, under cover of the tall grass, I was able to get very close to the place, when a woman in a near-by hut spied me and gave the alarm. Instantly about twenty natives, rather too suggestive of the kind described by certain great African explorers, materialized out of the thick guinea grass and, although not violently demonstrative in any way, intimated very definitely that I had no business there. So, assuming a preoccupied air, I told them, as best I was able, that while "cherchant les plantes pour remède" I had become lost and wished to go coastward. This information seemed to satisfy the men and they soon disappeared, leaving me in the charge of several women whom I finally managed to elude. I then continued my day's collecting in a direction opposite to that of the festivities. This particular ceremony lasted three days.

No ferns were to be found either in the coastal areas or the arid thicketed plains bordering the central range, but "La Source," a large valley near our camp, supported a comparatively rich growth. The stream, fed by a good-sized spring near the head of the valley, flows about a half-mile and then sinks into the dry soil. The banks are steep, rocky, and—away from the immediate vicinity of the stream—rather dry; but wherever the soil is deep enough and clearings have not been made, the slopes are thickly covered with vegetation. In many places the upper slopes, especially at the head of the valley, are broken by bare cliffs, crevices, and large piles

of jagged coral rock. On the summit of one of the latter was a thick growth of *Polypodium polypodioides*. *Adiantum melanoleucum* and *Pteris longifolia* were common on the lower slopes near water, while *Cheilanthes microphylla* and *Polypodium exiguum* were confined to the upper dryer regions. *Dryopteris guadalupensis* was common on mossy rocks about the spring. One large boulder near the stream was covered with an abundant growth of *Selaginella stolonifera*. A single plant of the silver-fronded *Pityrogramma calomelaena* grew in the damp soil near the water.

On the grassy table land, occasional cliffs and dry ravines furnished shelter for an abundance of *Adiantum melanoleucum*, *A. tenerum*, *Pteris longifolia*, and *Asplenium dentatum*. Large thickets of *Pteridium caudatum* covered some of the more open and level areas, many of these plants being six feet high.

After two weeks in the vicinity of Anse à Galets we broke camp and, taking advantage of quiet water enclosed by the reef, sailed about ten miles along the coast to the northwest, where we established a new camp on the barren outskirts of a small fishing village called Étroit. The general character of this region is similar to that of Anse à Galets, namely, an arid coast with salines, mangroves, and *Conocarpus* trees, a dry thicketed plain, foothills, and mountain slopes, an open summit, and occasional ravines. One ravine, "La Grande Source," is exceptionally large and well watered for this island. The bed is rocky and the sides steep and rugged. Nearly all the trees have been removed. Here, in addition to the ferns observed at Anse à Galets, were found *Tectaria heracleifolia*, *T. hippocrepis*, *Cyclopeltis semicordata*, *Adiantum cristatum*, and *Dennstedtia rubiginosa*.

Our work on the north coast of Gonave Island now finished, we returned to Port-au-Prince and here made preparations for a second trip, inland. We had planned to explore the lake regions east of the Cul-de-Sac and thence northward to Grand Bois, but civil troubles in that region forced us to change the latter part of our plan. We were able, however, to work the region south of Étang Saumatre, first on the southeastern shore in a region called Fond Parisien, and later in a portion of the La Selle mountains in the vicinity of Mission.

CUL-DE-SAC

The Cul-de-Sac, a large level plain, probably once the bed of an inland bay, is bordered on the west by the Bay of Port-au-Prince, on the east by Étang (or Lake) Saumatre, and on the south and north by a series of mountain ranges which arise rather abruptly on the north, but on the south are bordered by a considerable belt of foothills. Much of the Cul-de-Sac region is watered by streams which burst forth on the lower levels of the plain after having flowed a long distance underground through the dry hill regions from the mountains. The greater part of the arable land is given over to sugar growing, while thorny cactus thickets cover the arid portions.

Étang Saumatre, as well as Lake Enriquillo a short distance to the east, is salty, being apparently a remnant of sea cut off by an uplift of the Cul-de-Sac. Although the greater part of its shore bordering the Cul-de-Sac is arid, the northeastern portion is watered by a series of large springs which flow through a belt of meadows the vegetation of which is composed chiefly of small sedges. *Acrostichum excelsum* was common along the wet banks of the streams, and *Azolla caroliniana* grew abundantly on sluggish water.

Crossing to Fond Parisien, on the southern shore of the lake, we entered a region which, although supporting an especially interesting desert flora, was a disappointment so far as ferns were concerned. Only two species, *Dryopteris serra* and *D. patens*, were found, these growing along irrigation ditches and in wet meadows. While here we witnessed an extraordinary flight of butterflies. A hard shower following a very long drought brought to life millions of them and for several days they moved steadily westward in a continuous yellow cloud.

Chief among our difficulties here as in other parts of Haiti was the problem of procuring reliable men and a sufficient number of animals to transport our outfit. The small donkey, so typical of Haiti, seems to be more numerous than horses and mules. He is a gentle inoffensive creature but strong and well adapted to carrying heavy loads on the narrow and often slippery trails that lead into the mountainous regions of the interior. An interesting sight it is to see these little fellows coming into town on market days, almost hidden by their bulky loads of produce but bearing, on top of all, their respective owners, usually a market woman clad in bandana, mother-hubbard, and counter-less slippers that flop rhythmically to the jogging of her "bête." There is seldom much trouble in obtaining one or two animals for riding purposes, but as to hiring four or five—that is something extraordinary. Usually it results in hiring several men, each to accompany his own beast, whereas one would have been sufficient.

For our journey to Mission, about fifteen miles southward in the La Selle Mountains, we were able finally, through the influence of a local American planter, to procure four transports and a guide. The first part of the trip was uneventful, but toward the end we experienced some difficulty, as the way lay through a dry river

bed covered with round stones which made walking tiresome if not dangerous. Dr. Abbott and his two animals were soon outdistanced by the two I was endeavoring to follow, and behind him limped our cook, woefully bemoaning the fact that he was "malade de jambes"; and last of all, and practically out of sight, came our guide. Luckily the animals knew the route, otherwise we might never have found Mission.

WASHINGTON, D. C.

Ferns—Facts and Fancies About Them—VI

F. E. CORNE

Would not some of you like to try the experiment of sowing fern spores and watching the result? It is not at all a difficult thing to do and is very interesting. The spores of hothouse or house ferns may be bought from florists, and those of our native wild plants one can gather. Place any ripe fertile frond in press between white papers, and in a few days, as soon as it is quite dry, if carefully lifted it will leave on the white paper its exact impress composed apparently of fine brown dust, but in reality, as may be easily seen under the microscope, made up of innumerable spores. Spores will start growing upon almost any porous surface where it is moist and warm, as on wet peat or sand, and sporelings are often found on the outsides of flower pots in hothouses. To grow them properly fill a fern or bulb dish half full of broken bits of flower pots or other drainage material. On top of this a thin layer of moss, then about an inch of finely pulverized loam. This should be sterilized by placing the pot for an hour or so in boiling hot water, or by baking it in an oven. Then when cool enough and thoroughly moist but not wet,

sprinkle the spores mixed with a little fine sand or earth very evenly over the surface. Press down gently with a piece of smooth wood. Cover the pot with a piece of glass, set it in a saucer of water and leave it in the dark for several days. It should then be brought into the light but never into sunshine. Also it must never be allowed to get dry, and must not be watered from above, therefore the drops of moisture accumulating on the inside of the glass must be removed every day. In a short time, a few days or it may be weeks according to the species, a fine green scum looking like mildew will appear on the surface, and gradually it will be seen that this is composed of very minute almost microscopic scale-like prothallia. If the spores have been too generously sown, little clumps may be removed on the end of a penknife and planted elsewhere. When the prothallia have reached maturity, if proficient in using a microscope, one may be able to watch the wonderful process of fertilization.

Anyone who has become truly interested in ferns will almost inevitably want to do one or both of two things—start a fern garden, or at least a fern bed, and begin collecting for an herbarium, besides of course having potted ferns in the house. In regard to growing ferns let me quote a sentence I read lately which is very much to the point. "Ferns like most things in nature are sensitive to thoughtful tenderness and repay that consideration which consists, not in expensive outlay, but rather in loving study of a plant's likings and dislikings." Here in a few words are the directions for fern culture. Give the ferns what they need and as they need it and they will amply repay all your care. Shade, moisture, good earth and some stones are surely necessary, but each species has its individual likings just as people have. If a fern naturally grows in a wet rocky

place, it cannot reasonably be expected to thrive if planted in a dry garden bed without even the semblance of a stone under its roots. Nor will a plant whose natural habit is to carry its crown well above the ground be likely to live if buried deep, though other species may need to be treated in that way. Any one lucky enough to own a bit of moist woodland may be able to accomplish wonders with ferns and other native plants. Failing that, however, even a backyard in a city may be coaxed to harbor a few. If you do not know what treatment your plants require, inquire of those who do know. There are many dealers now who raise and sell native hardy ferns who doubtless would willingly help. And then there are books. The late Miss Grace Woolson's "Ferns and how to grow them" is full of practical suggestions.

The best earth for the majority of ferns is a mixture of fibrous loam, sand and peat, or leaf mould. The black woods earth is of course the best, but is not always easy to obtain. Save all the leaves from fruit and lawn trees in autumn, pile them up in a corner, and in a very few months the under ones will have become leaf mould. If conditions are such that the more delicate ferns cannot be arranged for, there are a dozen or more of our handsome common ones which once properly established will do well even under unfavorable conditions. The lady fern, marginal and spinulose shield ferns, the cinnamon and interrupted osmundas are among the best. The ostrich fern also will stand a good deal of sunshine and drought and a well established bed of it mingled with a few wild flowers like field lilies and others is a pretty sight. Under these circumstances, however, it never attains its normal height and beauty. The Christmas fern and the male fern are also very hardy but require more shade than is absolutely necessary for the others. So

also the polypody, bladder fern and of course the brake. Beware where you plant the brake! It is a wanderer, and one can never foresee where new fronds will come up. The rootstocks run deep, and it is difficult to dig up. One summer I found sporeling plants which I brought home and planted, as I thought, well outside of the fern bed, and was much disappointed when they all died down. But the rootstalks were by no means dead. Next spring vigorous fronds came up eight or nine feet away and right in the midst of my most delicate plants. The osmundas it is best to buy if possible. They also, except sporeling plants, are extremely difficult to dig up, as you may judge from an experience of my own. One summer when in the mountains I particularly wanted to take home with me a plant or two of the interrupted fern and was much pleased when I discovered a field of young plants, dozens of them scattered all over it. I decided to take several. But I counted without the osmundas. Not the slightest impression did my trowel make upon any of them. They all seemed to be anchored down to China. The rhizomes also seemed to be all linked together so that walking over the field felt as it might to walk over a huge spring bed. Finally at the very edge of the field I found a small plant which on touching it seemed to be loose. "At last here is one that I can easily dig up," I thought, and attacked it vigorously, only to find myself a moment later lying flat on my back, the handle only of my broken trowel remaining in my hand, while the fern was as firmly rooted as ever. So you see when advised to take an axe and a saw when you go fern digging it is not meant as facetiously as one might imagine.

Be sure to get the cinnamon osmunda. Although this fern grows much taller and is more beautiful in a damp thicket it does very well in a dry partially shaded place and is very attractive in early summer when a dozen or

more tall spikes of bright brown spore cases appear in the midst of a circle of green sterile leaves. It is the most flower-like of the so-called "flowering" ferns. In the mountains this fern sometimes assumes in autumn brilliant orange and brown colors vieing with the maple and sumac in beauty.

Miss Woolson tells us that, contrary to the general opinion, many of our wild ferns make good house plants. Some do well only through the summer and should in autumn be planted in the garden. Others do well almost the year round only requiring an enforced rest for a few weeks in a cool cellar during the winter. I have seen the maiden-hair spleenwort treated in this way and a very attractive pot plant it made. I read once an interesting thing about this plant. Brought from shade into the light and warmth of a living room the fertile fronds were seen to vibrate back and forth for some minutes, stopping occasionally, then starting off again. The ebony spleenwort and the polypody will also do well for a good part of the year, while the cliff brake Miss Woolson calls an ideal house plant. But it should never be turned round in order to have it grow symmetrically. It naturally grows against a rock and as "revolving rocks are not in the natural order of things," as Miss Woolson quaintly puts it, "this plant demands the privilege of standing still."

House ferns bought at a florist's almost invariably require to be changed to a pot one size larger and the earth loosened, as they are apt to be pot-bound, and then to receive a thorough watering. The best way to water ferns and many other plants is to set the pot up to the brim in a tub of water so that the ball of earth about the roots becomes thoroughly wet. Leave not longer than fifteen or twenty minutes. This should be done at least once a week, and ferns should be sprayed or

sprinkled with water once or twice a day. The best time to repot ferns is said to be toward the end of February before new growth begins, but the change may be made any time if care is taken not to disturb the roots. As a rule no water should be left in the saucer in which they stand. To prevent this when a fern pot is kept in an ornamental outer bowl, the bowl should be provided with a double bottom, preferably perforated, and some moss. Some recommend filling the bath tub with steaming water once a week and leaving the plants shut in the room for an hour or so. As we all know, very few plants will flourish in the dry hot air of the ordinary living room, especially if that room is lighted or heated by gas. The holly fern (Cyrtomium) and the Boston fern (Nephrolepis) seem to be the two which stand this abuse the best, though others with care may endure for a while. The best we can do is to remember the fern's greatest needs—frequent change of air, good earth, good drainage, plenty of moisture and to be kept away from draughts.

House ferns grown in too dry an atmosphere are at times subject to the attack of insect pests. Prompt action is necessary to preserve the beauty of the plants and to prevent the insects from spreading. The tiny red spider will succumb to water alone. The green aphis requires confined tobacco fumes. A minute black insect which loves to hide under scales of tomentose stems may be treated with "black leaf 40." Little white worms which sometimes appear in soil which has not been properly sterilized may be killed with lime water or ammonia water. The brown scale which is particularly partial to plants of the hard stemmed varieties must be scraped off, care being taken that none fall on the ground, and then the whole plant should be carefully sponged with whale oil or ivory soap suds, or with kerosene emulsion.

Badly infected fronds should be cut off and burned. Little slugs occasionally appear and these may be trapped under bits of carrot, potato or turnip placed on the ground. Under these they will hide and so can easily be found and destroyed. On two or three occasions some of the ferns in my garden were attacked by green worms or caterpillars which, working on the under part of the frond, first devoured the spores, and then ate holes in the leaf itself before being discovered. They clung tenaciously to the plant and had to be knocked off into a tin of kerosene and the plant sprinkled with hellebore.

CAMBRIDGE, MASS.

Unusual Fern Finds

HENRY MOUSLEY

Following up the suggestion made by Mr. W. R. McColl in the Oct.–Dec. number of the FERN JOURNAL, 1924, p. 104, I am here enumerating a few of my rarest finds amongst the ferns at Hatley, Stanstead County, Quebec. First and foremost let me say, I consider the rarest, as well as the most interesting, find of all to be the one figured in the accompanying illustration, which represents, not only an example of that rare and curious little form of the moonwort, *Botrychium onondagense*, but one, also, of dichotomous branching in the same species, which condition is very uncommon in any of the Botrychiums, and perhaps is unique in this particular species

or form, whichever you prefer to call it. As may be gathered from my recent paper in the above number of the JOURNAL, on *B. dissectum*, I have spent several years in intensive study of the Botrychiums, but never have I come across an example of dichotomous branching, until I found this one on July 10, 1924. The station where these little plants are found is a very small one indeed, and I have to limit myself to one or two specimens a year.

Probably my next rarest find is a plant of *B. virginianum*, discovered on June 16, 1924, bearing four fruiting panicles, a thing hitherto unknown to me in any of the Botrychiums, although I have examined some thousands of plants, the nearest approach to it being several examples in *B. obliquum*, *B. silaifolium*, and one also in the present species, with three fruiting panicles. In addition to these, I have found many examples in *B. obliquum*, *B. dissectum*, *B. silaifolium*, and *B. virginianum* bearing two fruiting panicles, as well as, in several cases, sori on the sterile fronds.

Of very small examples in this family, I have a plant of *B. virginianum* with fruiting panicle complete which is only 8 cm. in height, and one of *Ophioglossum vulgatum* still smaller, its total height being only 3 cm.

Amongst giant examples, I once found a plant of *B. virginianum* measuring 91.5 cm. in height, which is 30.5 cm. in excess of the extreme given in Gray's Manual! The sterile segment of this extraordinary plant measured 45.75 cm. across!

Amongst other interesting forms outside of the Botrychiums may be mentioned examples of *Polypodium virginianum*, forma *deltoideum*, corresponding to the example in plate No. 1 of the FERN JOURNAL for Jan.–March, 1924, with the exception that the spurs in my example only appear on the lower side of the two bottom

segments and not on the top as well. The tips, however, are elongated, and the plants might with equal propriety be referred to forma *elongatum*, of which I have several other examples, but in no case are the tips excessively elongated, although several of the segments in some cases are narrow and very pointed, and could therefore no doubt be referred to forma *acuminatum* also. These all came from the big gorge at Coaticook, Quebec, about nine miles to the east of Hatley.

In the FERN JOURNAL for April–June, 1924, pages 60–61, Mr. Weatherby gives the range of the very beautiful forma *cambricoides* of *P. virginianum*, so far as it was then known. It is with pleasure that I am able to extend this range into northern Vermont, for I have taken examples of this form near Montgomery, the only difference in my examples being that they are not quite so extreme and highly developed as Rev. F. W. Gray's from West Virginia, which is figured in the FERN JOURNAL for Jan.–March, 1924, plate No. 2. The var. *cambricum* of *P. vulgare* as I knew it in Europe is characterized by the acute tips of the segments, rather than by the great elongation of the same, as appears in Mr. Gray's example, which I should imagine is an extreme example of the forma *cambricoides*, but here my specimens are more like the English ones, *i.e.*, the segments are shorter.

Possibly these notes would hardly be complete without reference to the var. *aleuticum* of *Adiantum pedatum*, which I first found on August 30, 1920, about three weeks prior to its discovery at the foot of Mt. Orford by Mrs. L. Frances Jolly, of Berkshire, Vt., to whom I have already given credit elsewhere for really bringing the matter to light. Hitherto, this variety had only been found in the province of Quebec on the top of Mt. Albert, 3280 ft., and at Black Lake, Megantic County. It is

fairly well distributed around Hatley in a more or less pronounced form, according, no doubt, to the abundance or absence of the asbestos formation in the vicinity of the plants.

In conclusion, I trust I may not be the only one to comply with Mr. McColl's suggestion, and that ere long we may hear from other members of the Society, relating their red-letter days. The photograph from which the illustration was made was taken by the Geological Survey at Ottawa, and I am indebted to Dr. M. O. Malte, chief botanist, National Herbarium, Ottawa, for it, the specimen having been presented to the Herbarium.

MONTREAL, P. Q.

Data on Scolopendrium vulgare J. E. Smith

W. R. MCCOLL

As the station at Georgian Bay, and the immediate vicinity of Owen Sound, Ont., is the only known home for Scolopendrium in Canada (if we omit a small colony in New Brunswick) it makes the notes by Mabel R. Hunter, in the FERN JOURNAL, Vol. **14**, No. 4, 1924, concerning this plant in New York State unusually interesting to one who has for some years studied and taken the plant in this vicinity.

It is quite evident from the quantities mentioned in the above article, (two hundred and fifty plants being found in an area ten feet square), that conditions in New York State must be altogether favorable for this plant's requirements.

The Hart's tongue here, as it is commonly called, is intermittently scattered over an area of ten or twelve miles in suitable situations, on shaded limestone rock talus, broken outcrops of limestone, in limestone vugs,

around and underneath limestone boulders in shade of hardwood, on the walls of rock crevices where the openings are ten to fifteen inches wide, and upon shaded knolls.

It shows a persistent affinity for *Polystichum lonchitis* Roth, growing like twins with this hardy fern, especially when they are found in rock crevices or cropping out from beneath limestone boulders where their roots can feel the coolness of the rock surface, cuddled in as they are between the earth and stone.

We hear of plants with from ten to thirty fronds each, but no such thrifty specimens are found here. The average clump bears more often from three to six fronds and the longest leaf ever found measured twenty and one half inches—a single specimen only.

While the plants are apparently healthy, they seldom grow much over twelve to fourteen inches, and many appear pale in color. The finest plant seen here grew on a fifteen inch earth-capped igneous boulder and contained over a dozen fronds, it grew in shade and received nourishment from the wash of a gentle slope; this plant was removed carefully and planted in my garden on the north side of the house where I watched it for four years, dwindle and grow smaller, producing immature, ill-shaped, irregular edged fronds, lacking fruiting, and altogether uninviting in appearance.

Two years ago I planted another good specimen between the garden earth and the limestone foundation of the house on the north side where the roots could feel the coolness of the stones, and shaded it with *Aspidium spinulosum intermedium;* this was a success, grew healthily and sent up nice new leaves, fruited nicely, produced two forked fronds, and was green and healthy when winter tucked it in under a blanket of snow. The altitude here ranges from 586 to 723 feet, and while the

fern can usually be found, if one knows where to look for it, it is nowhere in such abundance as it is in New York State. The season of 1923 was particularly cold in the spring, and the late summer intensely hot, with little rain, the plants drooped, turned quite soft, lifeless, leathery, and went into winter quarters in this weakened condition. In the fall of 1924 the two best stations were thoroughly searched for good specimens, one in hardwood shade, strewn with large limestone boulders, the other on broken limestone outcrops, and neither station produced two dozen good plants, in fact it appeared as if the weather conditions of 1923 had practically ruined both locations.

In a search of nine years, only one specimen has been taken with long ears below (*auritum*) but the specimen is a splendid one, having ears two inches long. Short-eared specimens occasionally occur also, forked specimens are not uncommon, while two or three, with lateral branches protruding from above the centre of the frond, two to two and a half inches in length, are great rarities.

A form discovered last season was quite new to me, being long and narrow with extremely heavy, dark brown sori and the margins of the leaf deeply waved or undulating, the curves being uneven and erratic. This is scarce, and apparently only found on specimens that have survived under the deep snow of the previous winter. Possibly half a dozen fronds have been taken fruited from apex to base, the lower part of the frond not so fully covered as the apex; these are extremely rare, but fortunately one specimen found measured twenty inches long. Many freak forms can be picked up, such as auger shapes, round tips, moonwort shapes, twin stipes, double lobed tips, and many others. Forms most difficult to obtain are the narrow attenuate sort, with small lobes below, half inch wide at base and

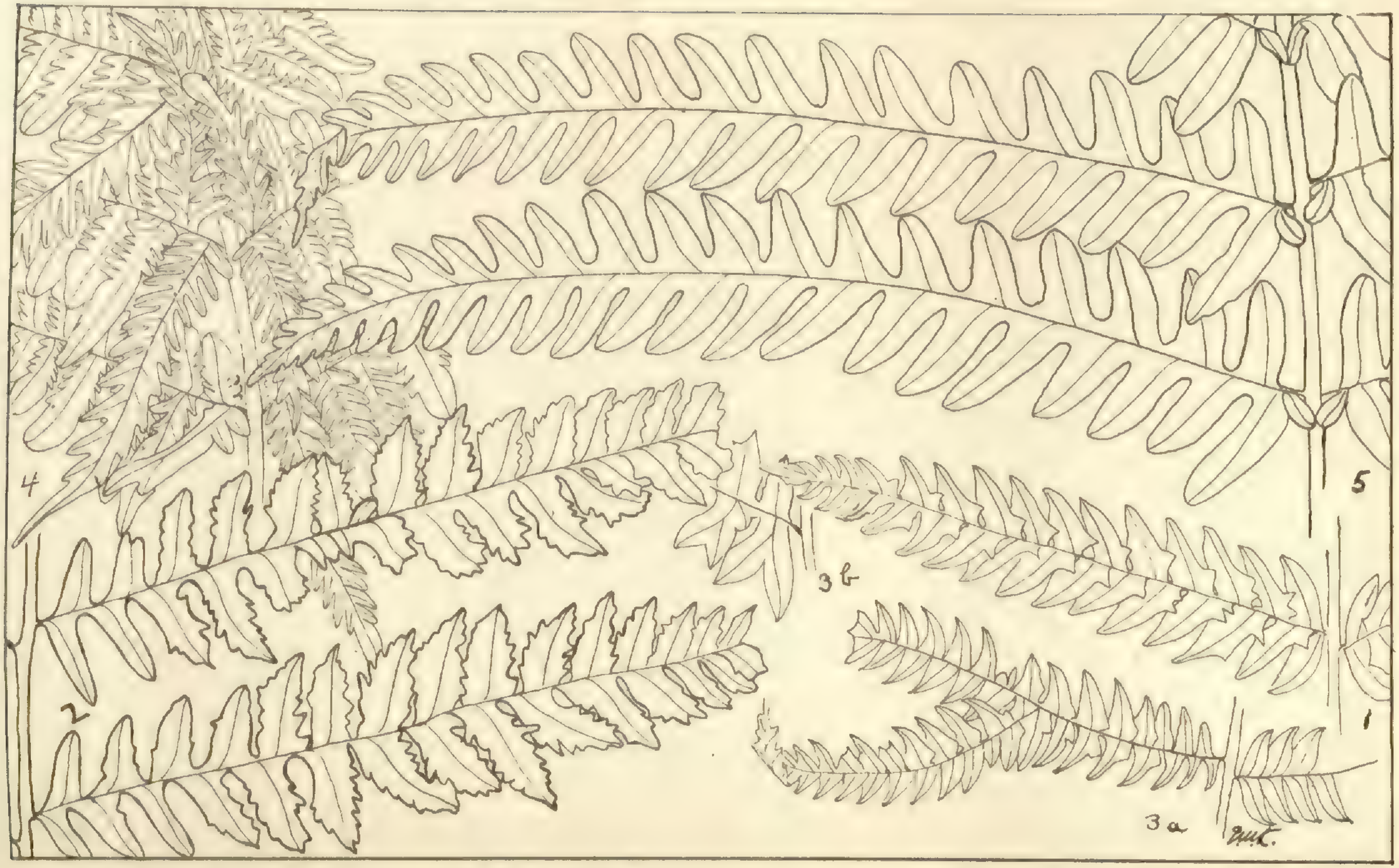
gradually expanding for two-thirds of its length to a width of one inch, the frond being about fifteen inches long; and a short, broad variety, measuring about two inches wide, of almost equal width from tip to base, not over ten inches long. The third of these rarities is a single plant containing seven fronds, none of which measure over one half inch in width, being about nine inches long, and of an equal width up to the sharply tapered and pointed apex; no swelling to the middle of the frond. This is thought to be our rarest form.

OWEN SOUND, ONTARIO

Notes on Cinnamon Ferns

E. M. KITTREDGE

Up to 1919 I had paid little heed to any ferns except the Maiden-hair and Christmas ferns, and then only for their decorative value. Cinnamon ferns were known to me, but I considered them ugly. In extenuation let me say that the plants were always much broken and discolored by the time I could see them. After seeing a rare fern exhibited with pride by the finder, and learning a little of the joy there might be in finding an unusual form, I began looking for variations from the type in both Interrupted and Cinnamon ferns, mainly, I think, because they were large plants and easily seen. During the next three summers I collected a great many fronds of both species, and regularly burned up the seasons "catch" at the summer's end, as there seemed never to be any of particular interest. In August, 1923, I came upon five Cinnamon ferns whose fronds were strikingly different from any I had seen, the lower inner pinnules being much elongated and incised, and so placed



Forms of Osmunda cinnamomea

they completely covered the rachis, giving the appearance of a double ruffle down the middle of the frond. Each frond had been somewhat damaged by passing cattle, but still were lovely, and I collected several. Later a friend referred my find to Hopkins' variety *auriculata*. (FERN JOURNAL, July, 1911).

During the season of 1924 I set myself to study Cinnamon ferns in the field, and as a result examined several hundred plants and collected over one hundred fronds, in various localities in Vermont, chiefly within a few miles of Proctor, although I collected more than twenty in the "Perry pasture" in Hartland, and five from my original five plants, which also were in that town, but some distance away. All of the Hartland plants grew in rather wet places, and in my later collecting trips I found the largest and finest plants in wet ground. I have a few beautiful fronds from the dry and rocky top of quite a high hill near Rutland, but they are not half the size of those collected in the swamp at the foot of the hill. With the exception of two, all the fronds collected in 1924 must be referred to *f. incisa* (Huntington) Gilbert, and *f. bipinnatifida* Clute, if one follows Blake's treatment of the species. (Rhodora, Sept., 1923.) Having little technical knowledge of ferns, I feel considerable diffidence in writing about any species and in particular this one, since my observations make me wish Dr. Blake had been a little less rigid in his classification. I found all the fronds that I examined, that must be called *f. incisa*, grouped themselves naturally into four divisions, or phases. 1st. The pinnules were normal except for a few on the pinnae of the middle third of the frond which bore 1–3 lobes, usually not at all prominent, but sometimes rather large and acute. 2nd. The lower inner pinnules would be much elongated and incised, and a few or many other pinnules more or less acutely lobed,

just as depicted in the Hopkins drawing. Occasionally these elongated pinnules would be much longer than indicated in the drawing and more deeply incised, as in my Hartland specimens. 3rd. Nearly *all* pinnules on the upper half or two thirds of the frond—with the exception of the first few nearest the rachis—would be deeply lobed and incised. 4th. The lower inner pinnules of fronds otherwise like No. 3 would be very long and deeply cut. In the 3rd phase I have two distinct forms, both beautiful but very unlike. One, first found in a swampy field in Pittsford, but afterwards collected in several places, is of the dull olive color and thick texture of the type; its pinnae are set close together on the rachis, and the pinnules are almost mathematically, and very acutely, lobed, and usually overlap (fig. 1). In the other found in Brandon and Rutland the color is a rich green, the texture is very *thin*, and the lobes of the pinnules, while acute, are not at all regular in shape and size and for the most part the lobed pinnules are somewhat broader than the others —altogether exceedingly handsome plants (fig. 2). And I may add that these plants had no dead fertile fronds, while the others did. In the 2nd phase—the auriculata phase—were some very interesting fronds. One had three forked pinnae and a good many forked pinnules (figs. 3a and 3b). Two from Hartland had no proper apex, but several forked pinnae forming a rosette. One from Lake Dunmore had the inner pinnules of the middle portion of the frond much elongated but without serration, while those on the upper part were much cut. Another from the same locality had many lower pinnules, and usually one or two upper, on *all* pinnae (save the two lowest) on the *right* side of the rachis elongated, while on the *left* side there was but the *one* lower elongated pinnule on a *few* pinnae. Some fronds collected near

Pleiad Lake must be considered as belonging in the 3rd phase, but were quite remarkable in being very *glossy* light green in color, pinnae opposite and wide spreading, a few pinnules lobed, all very acute at tip, and set almost exactly opposite on the mid-vein. The fertile fronds were delicate in structure, pale in color, pinnae wide apart, opposite, and wide spreading—that is, not at all ascending as in the common form. There were many plants.

The ferns that must be referred to *f. bipinnatifida* Clute occurred in several phases also. 1st. I have fronds whose 2–6 lower pinnae bear few to many pinnules somewhat cut. 2nd. Fronds otherwise like No. 1 have elongated, more or less cut inner pinnules on several or many pinnae. 3rd. Pinnae for the lower third or half of the blade will have several or many pinnules very much cut, and sometimes much crowded on the midvein, sometimes more widely spaced than in the common form. 4th. Fronds otherwise like the above have elongated, much cut lower inner pinnules. 5th. Two or several lower pinnules, and one or more upper, will be elongated and incised (Fig. 4). 6th. Several or many or all pinnules on *all* pinnae may be deeply cut, some pinnules being cupped, pinnae and pinnules crowded, and the lower pinnae forked. All of these phases, in both *incisa* and *bipinnatifida*, may be found in both starved and luxuriant plants, in fairly dry or quite wet situations.

One of the two fronds mentioned was a fine example of the variety *frondosa*, taken from an otherwise normal plant. The other came from a noble plant growing in a swampy field. It measured about fifty-two inches high and almost seventeen wide, maintaining that width for nearly the entire length of the blade. Pinnules are much broader than in the common form, and somewhat more widely spaced. The lower inner pinnules of the

middle third of the frond are very slightly longer than the others and have each one lobe next to, and occasionally overlapping, the rachis (Fig. 5). My observations cannot be called extensive, but from what I have seen I am ready to say that Cinnamon fern is to be found in many forms in any locality where the species is at all abundant. It seemed sometimes that no two plants in the same field were anywhere near alike. Again when specimens from stations twenty or more miles apart were compared, they were found to closely resemble each other, even to measurements, and in three cases similar forms had pinnae forked in almost exactly the same way. While resemblance in form was remarked, the great variation in color was also noticed, plants in the same field ranging from pale to rich deep green and dull olive.

PROCTOR, VT.

Recent Fern Literature

Bro. Victorin[1] has excellently supplemented his work on the ferns of Quebec (see this JOURNAL **13**: 118, 1923) with an illustrated pamphlet of 120 pages on the Lycopodiales (that is, the genera *Lycopodium*, *Selaginella*, and *Isoetes*) of that province. As before, his investigations cover a wide field and a great array of facts and opinions, historical, geographical, evolutionary, and otherwise, bearing on the species concerned, is brought together, organized, and set forth in lucid and interesting fashion. In part I, of 83 pages, the groups and species are discussed in detail; the remainder of the work is devoted to a systematic treatment, with keys, descrip-

[1] Victorin, Fr. Marie-. Les Lycopodinées du Quebec and leurs formes mineures. Cont. Bot. Univ. Montreal, no. 3. 121 pp., 2 pls., 11 figs. **Montreal, 1925.**

tions, and notes on medicinal and other uses, etc. Especially in Lycopodium, numerous varieties and forms are recognized, fifteen of them for the first time. Indeed, so minutely in this part of the work done that it seems very unlikely that anyone botanizing in the region covered can now lack a name for any form of Lycopodium he may find. In all three species of *Selaginella*, four of *Isoetes*, with two varieties and forms, and 11 of *Lycopodium*, with 31 varieties and forms are recognized. Following Fernald, *L. sitchense* is treated as a variety of *L. sabinaefolium* and, following Blanchard, *L. flabelliforme* is given full specific rank, not, as in Gray's Manual, treated as a variety of *L. complanatum*, or, as in the Illustrated Flora, ignored altogether.

Ferns and the Fern Society figure largely in the May number of the *National Geographic Magazine*. The featured article, on "Ferns as a Hobby," is by Dr. Maxon and the colored illustrations which accompany it were prepared by one of our members, Mr. E. J. Geske. In brief space, Dr. Maxon has contrived to give, very readably and with the usual profuse illustration of the *Geographic*, a remarkably comprehensive view of ferns in their various aspects. Their beauty, their imitators in other families of plants, their geography, their history in past geologic ages, their cultivation here and in England, and their economic uses, all are touched upon. Representative species of different parts of the United States are called to mind, and such marvellously different growth-forms as filmy ferns and tree ferns described. The joys of collecting among the wealth of ferns in the tropics are set forth so enticingly that, reading, one is moved to buy a machete and set forth at once, regardless of climate. Finally, a rather detailed account of the processes of reproduction in ferns and of each of the

15 species illustrated is given. Mr. Geske's paintings are reproduced in the natural colors against a black background. Whether this really serves to bring them out better than the usual white or tinted one may be questioned; but at any rate the pictures are accurate, life-like, and attractive.

American Fern Society

New members:

Clark, Hugh Savage, Lancaster, Mass.
Foote, Mrs. E. M., 119 East 40th St., New York City.
Jayne, Miss Addie, Hampton Institute, Hampton, Va.

Omitted from the recent list of members:

Leeds, Arthur N., 5321 Baynton St., Germantown, Pa.

The address of Mr. C. W. Jenks is Bedford, Mass., not New Bedford, as in the list of members.

By special request, H. E. Ransier, Manlius, N. Y., will undertake to supply Fern Society members with living specimens of hart's-tongue fern from the Jamesville, N. Y., station, which is being destroyed by the Solvay Process quarries, at 25 cents and postage. Immediate application is imperative. Small to medium-sized specimens only are available.

The thanks of the JOURNAL are due to Mr. Henry Mousley, who has given the illustration which accompanies his article in this number. We are indebted also to Prof. J. H. Schaffner for the use of the plate which appeared with his article in No. 2.

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R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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CHARLES HUMPHREY BISSELL, 1857–1925

American Fern Journal

VOL. 15 OCTOBER-DECEMBER NO. 4

Charles Humphrey Bissell

C. A. WEATHERBY

Professional botanists interested in floristics are comparatively few, and the demands on their time are large and insistent. Had it depended upon them alone, the gathering of the great mass of data necessary to even our present understanding of the distribution and classification of North American plants might have been long delayed. That it has been no slower is due to a very considerable degree to a line of devoted amateurs, keen observers and industrious collectors, who have given their leisure to the work. One of these—one of a particularly active group of them—was Charles Humphrey Bissell.

Mr. Bissell was born in East Windsor, Conn., Dec. 16, 1857. His ancestors were among the first settlers in the region; probably there has never been a time when the town was without someone of their name. His own earliest recollection was of being taken to the training camp at Hartford to see his father, then about to leave with one of the Connecticut regiments for service in the Civil War.

He was educated at the Chicopee, Mass., high school, where he was valedictorian of his class, and, for a year,

[Vol. 15, No. 3, of the JOURNAL, pages 69–100, plates 5–7, was issued Oct. 21, 1925.]

at the Massachusetts Agricultural College. He chose a business career, and began it as a bookkeeper at New Britain, Conn., in 1879. In 1882 he married Eva Valentine Matoon. In 1886 he moved to Southington, Conn., and started business on his own account. There he spent the rest of his life, a successful merchant and a man to whom his fellow townsmen turned with entire confidence in any matter which called for perfect integrity, sound judgment and constructive ability. These qualities he placed freely at the service both of community enterprises and, though always reserved in the expression of friendship, of individuals. "I think I never knew a kinder, more helpful person," wrote one of his friends; many botanists, to go no further, can testify to that quietly and cordially given helpfulness.

Mainly through Mr. Bissell's efforts, the very successful Southington Building and Loan Association was organized in 1912. From that time until his death he was continuously its secretary and practically the manager of its business. He had been president of the state league of such associations and was a member of the executive committee of their national organization. He was interested in the work of the Sons of Veterans, and had served as commander of the state and vice-commander of the national societies. Though never seeking and usually refusing, political office, he had served two terms as representative in the Connecticut Legislature. Here he was a member of the committee on state parks and forests and did what he could, in lean years of post-war readjustment, to further their development.

Mr. Bissell's interest in botany began in boyhood and to the end of his life, never waned. Soon after moving to Southington in 1886, he began the formation of an herbarium and the study of the local flora. For many

years most of his holidays were spent in the field, at first in the minute exploration of the country about his home, later, as the scope of his work widened, in longer trips. Among his frequent companions on these excursions, which he never liked to take alone, were the late H. C. Bigelow, well known to members of the Fern Society, and the writer. He was an admirable companion in the field, quick of eye and thorough in observation, ready to take with equanimity whatever might come, with a dry and pleasantly bantering humor, and also with a capacity for prompt and effective rebuke when occasion demanded. A single sentence from him taught one young botanist at least, once for all, not to collect rare plants wastefully.

The first result of these field studies was the *Flora of Southington and Vicinity*, prepared in collaboration with Luman Andrews, and published by the Connecticut Department of Education in 1902. It is an accurate and excellent record of a varied local vegetation, and it gave good training for later floristic work. It was followed by occasional papers in *Rhodora*, giving accounts of botanical trips of especial interest, records of extensions of range, and, in a few cases, descriptions of new varieties. One of his noteworthy observations was that *Polygonum Hartwrightii*, previously considered a good species, is no more than an ecological state of *P. amphibium*, produced when the common aquatic form of the latter is stranded by the drying up or draining of ponds and ditches in which it grows.

Mr. Bissell was one of the 22 charter members of the Connecticut Botanical Society, organized in 1903, and its second president, serving continuously in that capacity from 1912 until his death. He belonged to all the other New England botanical societies (as well as to the Torrey Botanical Club and the Botanical Society of America)

and was a frequent attendant at their meetings. He was one of the committee which prepared the Catalogue of the Flowering Plants and Ferns of Connecticut, published, after seven years' work, in 1910 as a bulletin of the State Geological and Natural History Survey. The elaboration of those parts of the manuscript relating to the ferns and to the sedges was under his charge; to him fell also, in large part, the task of seeing the completed catalogue through the press. The published work bears witness to the care he bestowed on every detail.

He had an especial interest in ferns, particularly the various and puzzling forms of the wood ferns. One of the features of his garden (otherwise notable for its display of peonies in June and gladioli in September, and for rare wild plants) is the large collection of these forms growing in its fern beds. In 1906 he contributed an annotated list of the ferns of Connecticut to the series of state fern floras then running in the *Fern Bulletin*. He had joined the Fern Society in 1897; in 1914 he was elected its president. Three years before the Society had decided on a rather radical change of policy and had begun the publication of an organ, the present FERN JOURNAL, wholly owned and controlled by it. The new policy had already proved itself a success; but it remained to consolidate that success and place it on a basis as nearly permanent as possible. To this task, as to all his botanical work, Mr. Bissell brought the sane and balanced judgment which marked his business enterprises and which those who knew him well felt to be especially characteristic of the man. The measures adopted during his three years' administration—the present budget system (suggested and worked out in detail by the then treasurer, Mr. F. G. Floyd), the institution of an emergency fund to meet unexpected expenses, the establishment of life memberships, the proceeds of which are held

as an endowment fund—have done much to set the Society firmly on its financial feet. They were supplemented by a successful drive for new members, during which and for a long time afterward, it was Mr. Bissell's custom to write a personal letter of welcome to each member received.

His last botanical work was done as a member of the Gray Herbarium Expedition to Nova Scotia in the summer of 1920. One of many interesting discoveries made by the party was that curly grass, until then known from only a single Nova Scotia station, was abundant at a number of localities in the western half of the province. Soon after his return home he suffered a severe attack of rheumatism, from which he never fully recovered; after four years of impaired health, he died at a sanatorium in Milford, Conn., April 6, 1925.

In accordance with his known wishes and as a memorial to him, his wife has given his herbarium, of some 20,000 sheets, to the Connecticut Botanical Society. Besides his own collections and exchanges, it includes the herbaria of the late H. S. Clark and of Mrs. Frances Wilson Starmer, both mainly of Connecticut plants.

A list of his publications, so far as known to the writer, follows. Where not otherwise specified, volume numbers refer to *Rhodora*.

Goodyera repens, var. ophioides in Connecticut. **1**: 40. 1899.

Hydrastis canadensis L., a New England plant. **1**: 157. 1899.

Eragrostis Frankii in Connecticut. **2**: 87. 1900.

Plantago elongata in New England. **2**: 156. 1900.

Abnormal flowers in Leonurus Cardiaca. **2**: 223. 1900.

A new variety of Zizia aurea. 2: 225. 1900.

The biological relation of Polygonum Hartwrightii and P. amphibium. **4**: 104. 1902.

Newly introduced species of Crepis and Leontodon. **4**: 249. 1902.

The rediscovery of Phaseolus perennis in New England. **4**: 13. 1902.

Some noteworthy plants of Connecticut. **4**: 98. 1902.

Ajuga genevensis in New England. **5**: 154. 1903.

A botanical trip to Salisbury, Connecticut. **5**: 32. 1903.

Galium erectum and Asperula galioides in America. **5**: 173. 1903.

A new station for Dentaria maxima. **5**: 168. 1903.

A new station for Asplenium pinnatifidum. **8**: 230. 1906.

The fern flora of Connecticut. Fern Bull. **14**: 1. 1906.

A day at Congamond Lakes. **13**: 53. 1911.

Notes on Connecticut plants. **13**: 30. 1911.

A new locality for Asplenium ebenoides. Fern Journ. **2**: 24. 1912.

With Luman Andrews:

Flora of the town of Southington and vicinity. Conn. School Document no. 15. 1902.

With Luman Andrews, E. H. Eames, C. B. Graves, E. B. Harger, and C. A. Weatherby:

Catalogue of the flowering plants and ferns of Connecticut. Conn. State Geol. & Nat. Hist. Survey, Bull. no. 14. 1910.

Additions to the flora of Connecticut. **19**: 105, 119, 224, 245. 1917.

With the same, except Mr. Andrews:

Additions to the flora of Connecticut, series 2. **24**: 111. 1922.

With M. L. Fernald:

Lycopodium clavatum and its varieties. **5**: 139. 1903.

A new variety of Lespedeza capitata. **14**: 91. 1912.

EAST HARTFORD, CONN.

Fern Collecting in Haiti--II

E. C. LEONARD

MISSION

Mission, a typical mountain village, consists of a few thatched huts and a whitewashed plastered gendarmery trimmed with the national colors, red and blue. Most of the inhabitants of this region live in scattered villages and come to Mission only on market days, to trade. The markets, indeed, are a very important feature of Haitian life, ranging, as they do, from the great markets of Port-au-Prince to small improvised ones along the roadway.

In the Mission region ferns were almost confined to two localities: one, a deep valley containing the "source," a small rapid creek utilized by the villagers for drinking and washing; the other, the wet thicketed upper slopes and summit of the La Selle range.

The upper portion of the Mission valley is V-shaped in cross-section, with its lower slopes covered by a dense growth of shrubs and small trees, and the upper slopes bearing at most a few scattered pines. A short distance from Mission the stream falls over a cliff about 60 feet high into a deep narrow ravine with vertical walls. Here the bed of the valley is filled with boulders and a thick growth of shrubs. The walls in some places are always wet with trickling water. Many ferns grow on the damp mossy rocks and in the rich soil at the base of the cliffs. Among these were: *Adiantum capillus-Veneris*, *Anopteris hexagona*, *Asplenium monteverdense*, *A. flabellulatum*, *Dennstaedtia globulifera*, *Dryopteris reptans*, *D. sancta*, *Nephrolepis cordifolia*, *Polypodium angustifolium*, *P. otites*, *P. squamatum*, *Selaginella Leonardi* (new), and *Tectaria hippocrepis*.

In addition, on the thicketed slopes above the falls were: *Asplenium cristatum*, *A. pseudoerectum*, *Didymo-*

chlaena truncatula, *Diplazium unilobum*, *Elaphoglossum longifolium*, *E. tovarense*, *Polypodium pectinatum*, *P. loriceum*, *P. vulpinum*, and *Polytaenium lineatum*.

Below the falls a half-mile or more the narrow valley opens, the stream and thickets disappear, and the bed and slopes gradually become arid. In these drier areas, where sufficient shade was afforded, grew: *Blechnum occidentale*, *Dryopteris oligophylla*, *D. patens*, *D. serra*, *Pityrogramma tartarea*, *Polypodium aureum*, and *Pteris longifolia*. *Polypodium crassifolium*, conspicuously perched on some tree or high boulder, was common.

The richest growth of ferns in the Mission region is found in the thickets of the upper slopes and summit of the La Selle range. Here fires, which too frequently are allowed to spread from new-made clearings, have entirely destroyed not only luxuriant fern thickets but valuable pine forests as well. The uninjured portions, watered by heavy dews and cloud mists, support a wonderful vegetation. At first sight the new and enthusiastic fern collector is held spellbound by the marvelous display. In one small thicket alone I found *Asplenium auritum*, *A. cyrtopteron*, *A. flabellulatum*, *A. salicifolium*, *A. serra*, *A. Sintenisii*, *Blechnum occidentale*, *Botrychium cicutarium*, *Diplazium Tussacii*, *Dryopteris alata*, *D. asplenioides*, *D. denticulata*, *D. effusa confinis*, *D. rudis*, *D. rupicola*, *Elaphoglossum muscosum*, *E. tovarense*, *Nephrolepis cordifolia*, *N. pectinata*, *Pityrogramma tartarea*, *Polypodium loriceum*, *P. piloselloides*, *Polystichum muricatum*, *Pteridium arachnoideum*, *Pteris hispaniolica* (new), and *Struthiopteris Tuerckheimii*. I left, feeling that many species yet remained undiscovered. *Cyathea Hieronymi*, a tree fern, was occasional hereabout.

The exhilarating coolness and freshness and the magnificent views make the summit of the La Selle mountains

PARTIALLY DENUDED UPPER SLOPES OF THE LA SELLE RANGE, NEAR MISSION. THE TALL ISOLATED TREES ARE PINES, THE REMNANTS OF LARGE FORESTS WHICH ONCE COVERED THE SUMMITS OF THE MOUNTAINS, BUT HAVE BEEN DESTROYED BY FIRES

superbly delightful. In the early morning, nothing is visible from these heights but the level white surface of a vast cloud lake. Later in the day the clouds rise and sweep the upper mountain slopes in waves of misty white fog, so thick that one can hardly keep the trail. (It is an easy matter to become lost if the forks are not well marked, and a wrong slope might mean a day's trip back to camp.) Finally, forming a mantle above the brow of the mountain or disappearing altogether, they disclose a wonderful panorama of the surrounding country to the north. Hundreds of square miles, including a large portion of the Cul-de-Sac, the three inland lakes—Saumatre, Enriquillo, and Limon—and many of the lower mountain ranges, are spread out in one vast relief map.

Our camp, at a much lower level near Mission, was not so pleasant. Aside from our cook's drunken fits and his threats of desertion we were pestered by numerous small flealike insects. The eggs planted by these pests, on hatching, filled our feet with masses of minute voracious larvae which had to be cut out to afford relief from pain. In spite of these inconveniences it was not without regret that we found it necessary after a stay of two weeks to leave what we felt to be an unfinished field.

FURCY

From Mission we retraced our route to Port-au-Prince and, after re-outfitting, proceeded to Furcy, a tolerably well known locality in the mountains some 15 miles west of Mission.

No one ever dies at Furcy; at least that is what the natives told us. Once established in the savage luxury of Fontenau's thatched hut nestled among the plantain and coffee trees, we could well believe this saying. Our

work in this region proved to be the most pleasant and productive part of our six months trip.

Furcy is a small collection of huts lying on a mountain spur (altitude about 4,300 ft.) which branches southward from what we believed to be Morne Tranchant. The summit of the spur is nearly flat, but its slopes are steep. The entire region, cleared for a long time past and mostly under cultivation, is noted chiefly for its peas. The uncultivated areas consist of bluegrass meadows and bracken thickets, with scattered clumps of shrubs. The soil, a red clay, seems to be rather deep on the summit but is shallow on the slopes, with frequent exposures of the underlying rock. Numerous small ravines furnish protection for an abundant growth of ferns. One near our house sheltered the following species: *Asplenium praemorsum*, *Blechnum occidentale*, *Botrychium cicutarium*, *Dennstaedtia ordinata*, *Diplazium Fuertesii*, *D. hastile*, *Dryopteris rupicola*, *Elaphoglossum tectum*, *Nephrolepis cordifolia*, *Polypodium aureum*, *P. loriceum*, *P. vexatum*, and *Polystichum triangulum*. The common species of the bracken thickets were *Dicranopteris flexuosa*, *D. furcata*, *Dryopteris oligocarpa*, *Lycopodium Fawcettii*, *Pteridium arachnoideum*, and *Struthiopteris Tuerckheimii*.

A mountain stream, called locally "La Grande Rivière," flows through a deep valley which separates a portion of the Furcy spur from Pic-de-Brouet. This stream was an almost uninterrupted series of cascades, rapids, and deep pools, bordered by small meadows and damp cliffs. Here, in addition to the ferns already listed from the higher slopes, were: *Adiantum cristatum*, *Anemia phyllitidis*, *Anisosorus hirsutus*, *Diplazium unilobum*, *Doryopteris pedata*, *Dryopteris patens*, *D. asplenioides*, *D. pubescens haitiensis*, *Equisetum giganteum*,

Pityrogramma tartarea, *Polypodium angustifolium*, *P. otites*, *Polystichum polystichiforme*, *Pteris quadriaurita*, and *Trichomanes Krausii*.

Pic-de-Brouet is the culminating point of a range bridging Furcy and Nouvelle Touraine, which is one of the main ranges of the La Selle group. The peak itself, as well as the very steep northern slope, is rocky and with little vegetation, but the wet southern and western slopes, although less steep, are covered with a dense growth of small trees and shrubs. Numerous narrow ravines cut the lower portions of Pic-de-Brouet. The summits of the intervening spurs thus formed are usually open or with scattering pines, while the slopes and beds of the ravines are clothed with nearly impenetrable mossy thickets that abound in ferns. Among the species collected in this region are the following: *Adiantum cuneatum*, *Alsophila quadripinnata*, *Anemia hirsuta*, *A. phyllitidis*, *Anogramma chaerophylla*, *Asplenium abscissum*, *A. auritum*, *A. cristatum*, *A. monanthes*, *A. monteverdense*, *A. praemorsum*, *A. pseudoerectum*, *A. salicifolium*, *A. serra*, *Blechnum occidentale*, *Botrychium cicutarium*, *Cyathea asperula*, *Cheilanthes Leonardii* (new), *C. micromera*, *Dennstaedtia ordinata*, *D. globulifera*, *Diplazium unilobum*, *D. Fuertesii*, *D. hastile*, *D. Leonardii* (new), *D. Tussaci*, *Dryopteris Abbottiana* (new), *D. asplenioides*, *D. effusa confinis*, *D. Germaniana*, *D. oligocarpa*, *D. pachyrachis*, *D. patula*, *D. pubescens haitiensis*, *D. rudis*, *D. rupicola*, *Elaphoglossum huacsaro*, *E. plicatum*, *E. simplex*, *E. tovarense*, *E. tectum*, *Hymenophyllum axillare*, *H. fucoides*, *H. microcarpum*, *H. sericeum*, *Hypolepis hispaniolica* (new), *Lycopodium cernuum*, *L. clavatum*, *L. dichotomum*, *L. reflexum*, *L. taxifolium*, *Nephrolepis cordifolia*, *Notholaena bonariensis*, *Odontosoria aculeata*, *Pityrogramma schizophylla*, *P. sulphurea*,

A GROVE OF PALMS NEAR FOND PARISIEN, WHERE SEVERAL SPECIES OF DRYOPTERIS GREW IN ABUNDANCE

THE ISOLATED MOUNTAIN KNOWN AS PIC DE BROUET. THE UPPER LIMITS OF THE FERN-BEARING THICKETS ARE SHOWN IN THE FOREGROUND. THE SLOPES ABOVE ARE DRY AND ROCKY

(Courtesy of the Smithsonian Institution)

P. tartarea, *Polypodium angustifolium*, *P. aureum*, *P. crassifolium*, *P. cultratum*, *P. lanceolatum*, *P. lasiopus*, *P. leucosticton*, *P. otites*, *P. oxypholis* (new), *P. pectinatum*, *P. plumula*, *P. rigens*, *P. squamatum*, *P. vexatum*, *P. vulpinum*, *Polystichum echinatum*, *P. machaerophyllum*, *P. polystichiforme*, *P. triangulum*, *Polytaenium lineatum*, *Pteris podophylla*, *P. quadriaurita*, *Struthiopteris Tuerckheimii*, *Trichomanes Krausii*, *T. radicans*, and *Vittaria filifolia*.

PETIONVILLE

Following our six weeks collecting at Furey we visited Petionville, a suburb of Port-au-Prince, lying about five miles to the east, in the dry foothills bordering the Cul-de-Sac. Here, while awaiting a boat homeward bound, we found a fair number of ferns. In one narrow ravine whose bed was filled with rocks under which flowed a large spring, ferns of the *Adiantum melanoleucum-Pteris longifolia* association grew abundantly. Along another stream flowing westward to Port-au-Prince were profuse stands of *Tectaria heracleifolia* and *T. martinicensis*, and with them the following: *Adiantum cristatum*, *A. tenerum*, *Asplenium dentatum*, *Dryopteris normalis*, *D. patens*, *D. reptans*, *D. serra*, *D. tetragona*, and *Notholaena trichomanoides*. *Anemia adiantifolia* was found commonly in the arid foothills, and with it an occasional plant of the rare *Asplenium dimidiatum*.

GONAVE ISLAND AGAIN AND THE TRIP HOME

We availed ourselves, at the last moment, of an opportunity to revisit Gonave Island, and spent a week at Pikmi, a fishing village on the southeastern coast. In a large well-watered ravine not far inland we added to our list *Dryopteris scolopendrioides* and *Pteris grandifolia*.

July 23 found us at last on board the S. S. Advance, bound for New York. Before leaving Haiti our ship touched at several ports—Petite Goave, Port-du-Paix, and Cape Haitien—to take on coffee, cotton, and honey. At Cape Haitien we spent a few hours ashore, and on a short trip just outside the city found, new to our collections, *Adiantum villosum*, *Anemia Underwoodiana*, *Lygodium polymorphum*, and *Pteris biaurita*.

Evidently our trip was a success. We collected in all nearly 10,000 specimens of plants, representing 2,608 numbers, as well as a quantity of land shells and insects. In addition Dr. Abbott prepared 201 bird skins, besides alcoholic specimens and skeletons. Some of the plants are of unusual interest as verifying the existence of certain old doubtful species described and rather crudely illustrated by Plumier in the latter part of the 17th century, while many others are noteworthy as coming from the type localities of species collected by more recent botanical explorers, prominent among whom are Raunkiaer, Buch, and Eggers. A fair number of their plants are in the U. S. National Herbarium.

In the identification of the flowering plants much valuable aid was given by Dr. I. Urban of Berlin, the well-known authority on West Indian botany. Most interesting among those named by him are *Arcoa gonavensis* and *Leonardia haitiensis*, both representing new genera as well as new species. He described, in addition, the following new species and varieties: *Abutilon Leonardi*, *Begonia Abbottii*, *Coccoloba neurophylla*, *Croton chaetodus gonavensis*, *Croton origanifolius abbreviatus*, *Dicliptera obtusifolia ciliifera*, *Galactia rudolphioides haitiensis*, *Guettarda spinifera*, *Isodorea Leonardi*, *Lyonia furcyensis*, *Malpighia micropetala*, *Marsdenia dictyophylla*, *Salvia Abbottii*, and *Tabebuia gonavensis*. Be-

Two characteristic lowland ferns along the half-shaded banks of a small stream near Petionville. The one with coarsely divided blades is Tectaria heracleifolia. The other, in the background, is Adiantum cristatum

sides, these, seven species of Piperaceae have been indicated by Prof. William Trelease as new. A large and peculiar tree cactus found abundantly in the Cul-de-Sac region was associated by Dr. J. N. Rose with an old illustration of Plumier's and was renamed *Neoabbottia paniculata.*

Partial sets of our plants were sent also to the New York Botanical Garden and the Gray Herbarium.

The pteridophyta totaled over 600 numbers, representing about 170 species. They have been identified chiefly by Dr. William R. Maxon, who has published several short papers in which some of the new species have been described and other interesting ones have been listed, as, for example, *Polypodium vulpinum,* known hitherto only from Brazil, and *Dryopteris alata,* a Haitian species first named by Linnaeus which except for crude illustrations had remained unknown for over 200 years. With further exploration more of these puzzles will be cleared up and without doubt many additional species not now known from Haiti will be found. From the standpoint of the fern collector most of the dryish lowlands and foothills regions are unpromising; it is the mountain territory, of which wide areas are wholly unexplored, that will yield the more interesting results, and in these regions there is ample opportunity for work for many years to come. Not all the species I collected are mentioned in the present paper; a complete enumeration, with critical notes, habitat data, and citation of numbers, is in preparation by Dr. Maxon.

WASHINGTON, D. C.

Ferns—Facts and Fancies About Them—VII

F. E. CORNE

The best time to transplant hardy ferns is also in the spring, but, as with house ferns, if care is taken not to disturb the roots, it may be successfully done at almost any time. If not to be replanted immediately, a quantity of wet sphagnum-moss should be wrapped about the ball of earth, and then all done up in heavy oiled paper to keep in the moisture; the kind used by fish dealers I find the best. The ferns will then keep nicely for a week or longer, and may be sent long distances by express or parcel post. One or two pieces of wood the length of the plant should be securely tied to the roots to prevent the plant from slipping and crushing the fronds. The whole should then be wrapped in corrugated pasteboard—the kind corrugated on one side only—or it may be securely fastened in a pasteboard or wooden box. Little ones travel well in *tin* biscuit boxes, never in pasteboard, if going on longer than a day's journey. The important thing is of course to keep the earth about the roots fresh and moist, and small ones dry out quickly. I have more than once had the disappointment of receiving valuable ferns dried out and ruined by improper or careless packing.

We all like to gather fern fronds in summer to put in vases of water either by themselves or with flowers to which they add so much grace, and it is well to know which will keep fresh in that way. The Dicksonia, or hayscented fern, is one of the very best for that purpose. It is delicate and graceful in appearance and if properly treated at first will keep fresh for nearly a week, and then, instead of withering, will gradually turn yellow, emitting all the while more and more of its delicious

fragrance. This fern frequently turns pure white at a touch of frost, which fact accounts for one of its many English names "gossamer fern." Ghost fern would seem to be almost more appropriate. The Christmas fern, marginal and spinulose shield ferns, polypody and some others will also keep fresh for some days, but all will keep longer if thrown into a tub of water when first gathered and left there until the fronds are thoroughly soaked.

The building up of an herbarium you will find to be a very agreeable pastime requiring of course some patience, and, to secure satisfactory results, taste and skill in mounting, but perhaps all the more alluring on that very account. When starting out to gather specimens, even if not going far, take a sharp knife and something in which to carry your finds. For a short distance a newspaper may be sufficient. Never hold in the warm hand a frond which you are intending to press and mount as the delicate lower pinnae or leaflets are apt to get injured, and mounted specimens should be as perfect as possible. Besides this some of the sturdiest looking, like the Sensitive fern, wilt very quickly after they are gathered, and the warmth of the hand hastens the process. Be careful to get the whole length of the stem, and if possible, and especially if small, a bit of the rootstock also as this adds to its value as a specimen and helps to identify species. In case of very small plants, if they are plentiful and not so rare that you commit vandalism in so doing, get a whole one root and all. Wash off while still soft any earth which may adhere to it, as later when pressed and dry this forms an unsightly mass which can no longer be removed and obscures the beauty of the root growth. Be sure if possible to gather both sterile and fertile fronds and, especially

if not familiar with them, tie them together with a bit of string, or place the fronds from each fern in separate papers to prevent confusion later. Also it is well to have on hand some slips of paper, or a small block on which to record at once the date and place of gathering and any other data which may add to the interest. If going off for some hours or longer a vasculum or botanist's tin box is almost indispensable. If this is supplied with some bits of damp moss the specimens will remain fresh in it for some days, though it is well to sprinkle them occasionally. Some carry a press, and put their specimens in it at once, but this is cumbersome and may cause annoying delays, especially to one's companions. A good sized portfolio, not less than 13 x 17 inches, containing sheets of damp paper is also good, or even a square waterproof bag held in shape by a sheet of corrugated pasteboard and supplied with damp newspaper will do fairly well. In addition a book or small portfolio for very small fronds is a help. The one important thing is of course not to allow the gathered fronds to wither before they are put in press. If any are too large to mount on the regulation 11½ x 16½ mounting sheets, they should be folded over once or even twice before pressing, as later they will be too brittle, and will break and look unsightly. If very large, only parts of fronds can be used, or they may be mounted in sections. On reaching home, if any fronds are quite withered they are of course useless, but if only wilted, do not despair, just throw them into a tub of water and leave them there for some hours, over night if you like, and next day you will probably be delighted to find that they have regained all their original freshness and beauty. This is especially apt to be the case with the fleshy Botrychiums or grape ferns. Once I successfully

tried the experiment of taking one of these which had been somewhat wilted before pressing, and with the mounting of which I was dissatisfied, off from the sheet of paper on which it had been glued for some months, freshening it in water and then remounting it. Before pressing these soaked fronds however the extra moisture should be carefully removed with a soft cloth, or blotter, and the absorbent paper in the press changed within a few hours. In an emergency when no press is at hand, two pieces of stiff pasteboard or smooth wood, a quantity of smooth newspapers and some heavy stones or flatirons will answer fairly well instead. A press which comes for the purpose, made of crossed slats of hard wood and which can be bought for a moderate sum at a botanical supply store, is the best thing; or if this is considered too clumsy, two pieces of heavy book binders' board will answer, and will take up less room. The press must of course be somewhat larger than the mounting sheets. Some quires of white absorbent paper called newspaper stock, and a quantity of gray felt blotting paper which comes for the purpose are needed, and are also to be had at a botanical supply store as well as other things which will be required. To fasten the press have ready three or four strong flexible straps of leather or webbing furnished with good patent buckles. Leather straps with ordinary buckles which require holes seem usually just too loose or just too tight, while with patent buckles the straps may be pulled tight to the limit of strength. In addition to the straps I often supplement with stones, heavy books or irons to add to the pressure. Sheets of corrugated pasteboard placed between the blotters, by allowing a current of air to pass through are thought to hasten the drying process.

When ready to put them in press, lay the gathered specimens arranged as gracefully as possible separately,

each with its label beside it, within folded sheets of the white paper (newspaper stock, or newspapers may be used if more convenient). Carefully straighten out with a fine brush or small pointed stick any crumpled pinnules. Each white sheet containing the fronds to be pressed should be placed between two of the gray felt papers, then one of the corrugated pasteboards, the gray again and so on. The gray blotters should be changed for fresh dry ones at least once within the first twenty-four hours (oftener will do no harm) and it is well to change again two or three times within the next few days. The blotters when removed should be dried in the sun or other warm place in readiness to be used again. The filled press should also be left in a warm place to hasten the drying process and so perhaps help to preserve the color. The specimens should be left untouched in the white paper until quite dry, changing only the gray felt.

How best to preserve the color of dried specimens seems to be an unsolved problem. Sometimes they will remain green and fresh looking for years, again some will quickly turn brown without apparent reason. To absorb the moisture from them as quickly as possible would seem to be one important factor, and perhaps the age of the leaf at the time of gathering may be another. It is said that powdered salicylic acid or boric acid sprinkled on them before drying, or laying them between papers dipped in a solution of one of these, will preserve their color, but I do not know whether or not this has been proven. Certainly it is not generally practiced, but it would be an interesting experiment to try.

CAMBRIDGE, MASS.

Recent Fern Literature

One of the most interesting phases of Dr. Benedict's study of the forms of the Boston fern, the investigation of the progeny raised from spores of the single fertile form so far known (christened *fertilis*), has now reached a stage where it is possible to report on it. The origin of *fertilis* is not certainly known, but it is supposed to be a bud sport of the common commercial variety *Piersoni*, which it closely resembles except in being abundantly fertile and in a coarser texture quite like that of the wild *exaltata*. Its progeny of the first generation showed very great variability; among 200 sporelings it produced forty distinguishable forms, ranging, in leaf cutting, from a once-pinnate type superficially the same as the original *exaltata* to one nearly thrice-pinnate, and varying also in other characters. A considerable proportion have proved fertile.

From plants of four of these forms, selected to show different types of variation, second generation spore cultures were made. Two of these were remarkable for their uniformity, in sharp contrast to the wide variability shown in the first generation. In the other two the range of variation, though considerable, was less than in the first generation cultures, and in both cases the individual plants selected as parents were themselves unstable in the degree of division of their leaves. The few new forms produced were due to progressive variation.

Evidently, the behavior of these second generation sporelings is of much interest. For if it be at all generally true that new forms, once produced, tend to so considerable an extent to stabilize and reproduce themselves with little new variation and that little progressive (that is, developing further characters already present), then much light is thrown on the manner in which new

species may be produced and established in the wild. As Dr. Benedict points out, there seems every likelihood that the processes involved are the same.[1]

SAVING THE HART'S TONGUE.—Acting on the plan that the best way to save our plants is to propagate and so increase the existing number, the spore culture of Hart's Tongue fern was started some months back in the Brooklyn Botanic Garden, from leaves sent by Professor Petrie, of the State College of Forestry, Syracuse, New York. The spores were sown in eight-inch pans, and a good germination was obtained. During the past summer, the prothallia reached full size in many cases, and the young sporophytes began to appear. The earliest of these, about one hundred, were picked out and some of them are now showing several small leaves. The remaining prothallia have been separated and given more space and are in healthy condition. Eventually there should be at least one thousand new plants.

These will be available for distribution to those who may be interested to try to naturalize them. Lime stone locations are probably necessary, although it is possible that fair growth might take place in the absence of limestone.

The propagation of these ferns is simple requiring for the first ten months only two or three square feet of greenhouse space for the spore pans. As the plants reach larger size in the coming spring, they can be set out in lath shade for another season's growth outdoors; although probably most of them will be large enough for distribution during the coming spring. I do not recall any definite estimate of the total population of Hart's Tongue plants in New York State, but it would

[1] Benedict, R. C. Variation among the sporelings of a fertile sport of the Boston fern. Journ. Heredity **15**: 379–394, figs. 8–16; 421–431, figs. 4–9. 1924.

be very simple for any one to multiply that population many times at the expense of a small amount of greenhouse space, and relatively little care and attention. The same plan followed for other ferns and for native flowering plants is suggested as fundamentally the most important conservation method.—R. C. BENEDICT, *Brooklyn Botanic Garden.*

American Fern Society

A field meeting of New England members of the Society was held at Monterey, Mass., August 18 to 23, 1925. The place was chosen—indeed, the meeting was held at all—largely through the kindness of Mrs. J. H. Parker, a member who has a summer residence at Monterey. The interest shown by the proprietors of the Brook Bend Tavern and of Ledgehurst also helped to make it possible: and without the active and cordial assistance of Miss Addie Jayne and Mr. S. W. Bailey it could not have been the success it was.

The first day was more than warm and, with Miss Jayne as guide, the party sought the woods along the Konkapot River, where dwarf scouring rush and many woodland ferns were found, and fine patches of oak and long beech ferns duly admired. In the afternoon Miss Jayne led us to "Hall's Sugar Bush" to hunt for Woodsias on dry limestone ledges. In seeking to cool off in the wet meadow below *Ophioglossum* was found. Next day Miss Jayne took us to a very attractive spot known as Hyde's Ravine to see the walking fern, and the rich old woods nearby produced Goldie's fern and the narrow-leaved spleenwort. In the afternoon a hillside where Mrs. Parker had found a crested silvery

spleenwort was visited, but the place had been cut over and the plant was not found again. The heat was so fierce that we soon sought the shelter of the cool woods on the Parker land on the shore of Lake Garfield.

One day we devoted to limestone "cobbles" and the "Bear's Den" in the township of Sheffield. Mr. Bailey showed us where the rare hybrid, *Asplenium ebenoides*, and its parents, and also *Woodsia obtusa* and *Pellaea atropurpurea*, grew. At lunch time he gave us a treat by exhibiting his charming colored slides of ferns and orchids. On another day the party, again led by Mr. Bailey, climbed Monument Mt., Stockbridge, to see his station for *Asplenium montanum*, and waded through a Lenox swamp in search of wood fern hybrids. Wonderful patches of *Dryopteris hexagonoptera* were properly admired. The last day was spent on "Babes' Hill" and in the Quarry Woods, Salisbury, Conn., where Mr. Weatherby took the party to show them *Asplenium Ruta-muraria*, which we had not seen during the week. Some of the party also climbed Mt. Everett, the highest point in southern Berkshire County.

The party was honored by being let into a particularly well-kept secret—the fact that for at least fifty years a small colony of climbing fern has existed at Monterey.

The net proceeds of the week were fine views, pleasant acquaintances, and a general good time; and, in the way of plants seen, 50 species and seven varieties and forms of ferns and fern allies. These are as follows: True ferns (nomenclature mostly of the Index Filicum): *Adiantum pedatum; Asplenium ebenoides, montanum, platyneuron* and its forma *serratum, Ruta-muraria*, and *Trichomanes; Athyrium acrostichoides, angustifolium*, and *angustum*, the last mostly of the var. *rubellum; Camptosorus rhizophyllus; Cystopteris bulbifera* and

fragilis; Dennstaedtia punctilobula; Dryopteris cristata and var. *Clintoniana, Goldiana, hexagonoptera, intermedia, Linnaeana, marginalis* and its forma *elegans, noveboracensis, Phegopteris, spinulosa,* and *Thelypteris; Lygodium palmatum; Onoclea sensibilis; Osmunda cinnamomea* and forma *incisa, Claytoniana,* and *regalis; Pellaea atropurpurea; Polypodium virginianum; Polystichum acrostichoides* and forma *incisum; Pteretis nodulosa; Pteridium latiusculum; Woodsia ilvensis* and *obtusa.* Grape ferns: *Botrychium obliquum* and var. *dissectum, ramosum, ternatum,* var. *intermedium,* and *virginianum; Ophioglossum vulgatum.* Horsetails: *Equisetum arvense, fluviatile, hyemale, var. affine, scirpoides,* and *sylvaticum.* Club mosses: *Lycopodium annotinum,* var. *acrifolium, clavatum, complanatum,* var. *flabelliforme, lucidulum, obscurum* and var. *dendroideum; Selaginella rupestris.*—UNA F. WEATHERBY.

Dr. Ezra Brainerd, a member of the Society since 1911, and a botanist who will be much missed, died at Middlebury, Vt., December 8, 1924, nine days before completing his eightieth year. He was a graduate of Middlebury College and, after being trained for the ministry, returned there to teach in 1868. His intellectual attainments were wide and varied; he served as professor of English literature, of physics and of mental and moral science, and as president of the college, a post he held from 1886 to 1908, when he retired. With all these occupations, he maintained an active interest in botany. He collected extensively in Vermont and during journeys to other parts of the country. He was one of the founders of the Vermont Botanical Club in 1895 and its president continuously from that year until his death. He was one of the committee

who compiled the excellent Flora of Vermont, published in 1900. About that time he was attracted to the stemless violets, and by herbarium study, field observation and the growing and breeding of hundreds of plants in his garden, he was able to show that the many puzzling forms they present are largely due to hybridization among a number of related species. His conclusions have been very generally accepted by botanists; it is not often given to an amateur, busy with other things, to make so sound and solid an addition to knowledge. Later, in collaboration with Dr. Peitersen, he applied similar methods to the even more difficult problem of the classification of our blackberries. Their results have been published in two pamphlets on the blackberries of New England. His final words on the violets are to be found in his "Monograph of North American Violets" (1921) and "Some Natural Hybrids in Viola" (1924), the latter issued just in time for him to see a copy in completed form before his death.

Mary Adam Noble, a member of the Society since 1896, its Vice-President from 1917 to 1919, inclusive, and for a time acting President during the disability of Mr. William Palmer, died at her home in Inverness, Florida, February 15, 1925. She was the eldest daughter of Dr. George Adam, of Canaan, Conn., where she was born August 13, 1847. She was educated at private schools at Canaan and New Haven, and married, at Canaan, Rev. Mason Noble (1832–1916), a graduate of Williams College (1862) and of Union Theological Seminary (1865), for several years a pastor of the Congregational Church at Sheffield, Mass., and afterward professor of Greek at Talladega College, Alabama. They settled in Florida in 1887, living for about twenty years at Lake Helen, in Volusia County, and then at Inverness.

in Citrus County. Mrs. Noble was for many years an enthusiastic amateur botanist, interested particularly in ferns and mosses; she was a member of the Sullivant Moss Society from 1916. At one time her herbarium was destroyed by fire, but she worked energetically to repair the loss as far as possible. She contributed twice to the pages of the AMERICAN FERN JOURNAL (**4**: 65, 66, and **6**: 42–44), in both instances writing of the rich fern flora of the region in which was located her home at Inverness. One who knew her well has written: "A life of many cares, and among the cares sorrows were her companions at times, but books, and God's out-of-doors, carried her over many a spot where one more self-centered would have failed."—J. H. BARNHART.

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Mr. C. L. Gruber has become a life member.

Mr. Allan MacCaskill, Jr., Colerain, Victoria, Australia, would like to exchange specimens with members of the society.

The hearty thanks of the JOURNAL are proffered to the Smithsonian Institution for the loan of one of the plates accompanying Mr. Leonard's article in this number and to Mr. Leonard himself for contributing another of the illustrations.

The Judge of Elections reports as follows:

"Charles S. Lewis, Secretary, American Fern Society, Trenton, N. J.

Dear Sir:

The members of the American Fern Society have elected the following officers for the year 1926, each one having received ninety-four votes.

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Very truly yours,

M. S. BAXTER, *Judge of Elections.*"

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ERRATA

Page 56, lines 1 and 5: for *bipinnatifidum* read *bipinnatifida*.
Page 98, first line of foot-note: for and read et.

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EDITORS

R. C. BENEDICT

E. J. WINSLOW

C. A. WEATHERBY

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American Fern Journal

VOL. 16 JANUARY–MARCH NO. 1

Soil Reaction Preferences of three Adder's-Tongues

EDGAR T. WHERRY

In recent "Notes on some local plants and their soil acidity" the writer[1] referred to the apparent divergence in soil reaction preferences of the three eastern Adder's-tongues, *Ophioglossum vulgatum* L., *O. vulgatum minus* Moore, and *O. engelmanni* Prantl. Since that note was prepared opportunity has arisen to observe these in many additional localities and over a wide geographic range, and the essential constancy of their soil reactions has been well established. The present article is published to place on record the new data, as well as certain extensions of range.

In Gray's Manual, 7th edition, 1908, *O. vulgatum* is not assigned any geographic range, implying that it is widespread; in Britton and Brown's Illustrated Flora, 2nd edition, 1913, it is stated to occur from "Prince Edward Island to Ontario south to Florida." It actually ranges, however, considerably further west, having been observed in all the Gulf States and in Oklahoma, and being recorded from as far northwest as Montana.[2] Tests have been made at over 20 localities, from Maine

[Volume 15, No. 4, of the JOURNAL, pages 101–134, plates 9–11, was issued January 15, 1926.]

[1] Bartonia 8: 33, 1924.

[2] M. J. Elrod, AM. FERN JOURN. 7: 125, 1917.

to Oklahoma, and the soil where it grows well has always proved to be clayey in texture and weakly acid in reaction.

The plant termed in Gray's Manual *O. vulgatum* var. *minus*, in Britton and Brown *O. arenarium*, is recorded by both from New Hampshire, New York, and New Jersey. This range should be extended to include Maryland, for fairly typical material occurs at several places on the Coastal Plain in this state, a short distance to the northeast of Washington, D. C., especially near Ammendale and Riverdale. Its soils are throughout sandy in character and strongly acid in reaction.

O. engelmanni is ascribed in Gray to "Va."; Mo., Tex. and Cal.; in Britton and Brown, Ind. and Va. to La., Tex. and Ariz. That it actually does grow in Virginia is shown by material now in public herbaria collected by W. A. Murrill at Staunton some years ago; and in August, 1925, it was discovered by the writer still further northeast, about 2 kilometers (1½ miles) north of Luray, Virginia, in association with a new species of prickly-pear. Its range should also be stated to include Florida, for it has been observed to grow in the northern part of that state. In some 10 localities at which it has been studied, it grows on ledges of limestone or other calcareous rocks, and the soil is normally slightly alkaline.

The dates given in the manuals for these three types are also too restricted. On the two which reach the Gulf coast, the fruit begins to ripen in March. In Virginia *O. vulgatum* sheds its spores in May, while unripe fruit was observed on *O. engelmanni* in late August, so that its range should include September. The fruiting of *O. vulgatum minus* appears, however, to be limited to July and early August, so far as it is at present known.

The writer is not qualified to discuss the question as to whether the so-called *O. vulgatum minus* is a form, variety or subspecies of *O. vulgatum,* or an independent species; but in publishing this note desires to call to the attention of anyone who may take up this problem the fact that as far as soil reaction is concerned the three plants are all clearly distinct. This is brought out in the accompanying tabulation, where *o* means not observed, *x* means grows and *X* means thrives, at the degree of acidity or alkalinity heading each column.

TABLE 1.—SOIL REACTION PREFERENCES OF ADDER'S-TONGUES (OPHIOGLOSSUM SPP.)

	Mediacid	Subacid	Minimacid	Neutral	Minimalkaline	Subalkaline
O. vulgatum minus	X	x	o	o	o	o
O. vulgatum	o	x	X	x	o	o
O. engelmanni	o	o	o	x	X	x

WASHINGTON, D. C.

Wood-Ferns on Mt. Desert Island, Maine

EDGAR T. WHERRY

In the course of the writer's studies on the plant ecology of Mt. Desert Island special attention has been paid to the distribution of the various types of wood-ferns. Using well recognized names for these, *Dryopteris spinulosa* (Muell.) Kuntze appears to be common throughout

the island, especially in swamps. *D. intermedia* (Muhl.) Gray is fairly abundant in woods, less so in swamps. *D. spinulosa* var. *americana* (Fisch.) Fernald is local in distribution, but thrives in the spruce woods at all elevations, both along the coast and in ravines between the higher mountain ridges. It is certainly more frequent than indicated in Rand and Redfield's Flora of Mt. Desert Island. *D. boottii* (Tuckerm.) Underw., not listed by Rand and Redfield, is occasional in swamps, especially toward the north side of the Island. What appear to be intermediates between certain of these are also found, as noted below.

As a site for detailed study a strip, 10 by 75 meters, along the rocky hillside in the spruce forest back of Otter Cliff, toward the southeast corner of the island, was selected, because of the presence there of all three types, and the 100 plants in it were examined as their frond-outline, glandularity of indusia, and rootstock. The results are presented in table 1.

TABLE 1. WOOD-FERNS IN OTTER CLIFF SPRUCE FOREST (DRYOPTERIS SPP.)

OUTLINE	glabrous	INDUSIA slightly glandular	strongly glandular
very broad	*spin. americana* 43%	X 10%	X 5%
fairly broad	X 31%	X 1%	X 4%
oblong or ovate	*spinulosa* 2%	X 2%	*intermedia* 2%

Similar results could no doubt be obtained in other parts of the island, for mingling of the three named types and intermediates between them, including the particu-

Dryopteris spinulosa, var. americana in the Mt. Desert Woods

larly noteworthy broad fronds with glandular indusia,[1] was observed elsewhere, especially in the Western Mountain region. It should be noted in this connection that in no case were the scales dark brown in color, nor present in quantity far up the stipe or rachis, so that these broad glandiferous plants clearly do not represent the European-west-American *D. dilatata*.

To ascertain if similar numerical data could be obtained in a group where intermediates between the more or less well-marked species have long been recognized (and explained as due to hybridization), attention was directed to *D. boottii* and its relatives. In an irregular area in the series of swamps and adjacent woods toward the northern side of the Island known as the Barcelona, perhaps 200 meters in average diameter, 100 plants of wood-ferns and swamp-ferns were studied, with the results shown in table 2.

TABLE 2. WOOD-FERNS AND SWAMP-FERNS IN BARCELONA SWAMPS (DRYOPTERIS SPP.)

OUTLINE AND MARGINS	INDUSIA glabrous	slightly glandular	strongly glandular
very narrow; fine-toothed	*cristata* 52%	X 1%	0
fairly narrow; medium-toothed	X 2%	X 10%	*boottii* 12%
oblong-ovate; coarse-toothed	*spinulosa* 10%	X 1%	*intermedia* 12%

The fact that the distribution in this group, where hybridization is commonly admitted, is similar to that in

[1] The apparent rarity of which has recently been pointed out by Clarkson, Am. Fern J. 14: 67, 1924.

the spruce-forest group (table 1), suggests that the same relation may hold in the latter. It is interesting to note that there are so few apparent intermediates between *D. spinulosa* and *D. intermedia*—whereas if these were really only varietally distinct as often held, many would be expected—while at the same time there are numerous intermediates between the presumably more distantly related pairs, *intermedia-cristata* and *intermedia-americana*. How these relationships should be reflected in the nomenclature must be left to specialists in taxonomy, but the present observations seem worth placing on record in view of the scarcity of data as to the abundance of such intermediate forms.

WASHINGTON, D. C.

New Tropical American Ferns—III[1]

WILLIAM R. MAXON

The two species first described herewith are from Costa Rica and Cuba, respectively. The Notholaena, which is remarkably distinct, is characterized upon ample material collected by Dr. Erik L. Ekman in the course of his extended botanical exploration in Cuba.

Polypodium bryophilum Maxon, sp. nov.

Rhizome short-creeping, less than 1 cm. long, 2 mm. thick, the apical portion obliquely paleaceous; scales subulate-acuminate, subfalcate, 2–2.5 mm. long, 0.2–0.3 mm. broad, bright brown, rigid, thickish, fragile, subentire. Fronds several, subfasciculate, pendent, 8–14 cm. long, the stipe delicate, brown, 3–4 cm. long, bear-

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[1] Published by permission of the Secretary of the Smithsonian Institution.

ing a few lax, branched, capitate-glandular hairs, lightly alate upward, passing gradually into the attenuate blade; blades simple and entire, liguliform, the largest 10 cm. long, 8 or 9 mm. broad, evenly attenuate in the basal third, abruptly rounded-acutish at apex, the tip subcuspidate; margins lightly repand in drying, with a narrow border of lustrous blackish-brown sclerotic tissue; costa evident beneath to the middle or beyond, slender, brown, lustrous; veins free, immersed, dark, evident by transmitted light, diverging from the costa at an angle of 40°–50°, the sterile ones simple; sori oval, extending from apex to middle, each terminating or wholly occupying a short oblique distal spur arising one-third the distance from base of vein, thus subcostal. Leaf-tissue firmly chartaceous, sublustrous, at first bearing a few remote, branched, glandular hairs beneath.

Type in the U. S. National Herbarium, no. 1,181,642, collected from a densely mossy tree trunk above La Palma, on the road to La Hondura, Costa Rica, altitude 1,700 meters, July 17, 1923, by William R. Maxon and Alfred D. Harvey (no. 7980).

The present species belongs to the small group of *P. marginellum* Sw., discussed by the writer several years ago,[2] and is presumably the plant reported from Costa Rica by Christ[3] as *P. marginellum*, a species which apparently is restricted to Jamaica. It is most nearly allied to *P. nigrolimbatum* Jenman, of Jamaica and northern South America, and *P. Hessii* Maxon, of Porto Rico, which also have the sterile veins simple and the sori borne near the costa. *P. nigrolimbatum* differs notably, however, in its numerous rigid, stiffly erect, semi-opaque, narrower fronds, the margins more strongly sclerotic; and *P. Hessii* is distinguished by its attenuate or even subcaudate apices, its sharply embossed veins, and thinner leaf-tissue. In both these species the veins diverge at a more acute angle (30°–35°).

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[2] Bull. Torrey Club 42: 219–225. 1915.

[3] Bull. Herb. Boiss. II. 4: 1101. 1904.

Notholaena Ekmani Maxon, sp. nov.

Rhizome nodose-multicipital, the divisions short, close, ascending, densely paleaceous, the scales tufted, rigid, acicular, 2–3 mm. long, brownish-fuscous, lustrous, spinescent-ciliate. Fronds numerous, fasciculate, erect or rigidly ascending, 15–25 cm. long, the stipes shorter than the blades, dark brown, sublustrous, deciduously brown-setose; blades narrowly linear, 8–13 mm. broad, simply pinnate, the rachis similar to the stipe; pinnae numerous, alternate or subopposite, subdistant to remote, slightly oblique, stalked (1–2.5 mm.), broadly oblong, 4–7 mm. long, 2.5–4 mm. broad, rounded at apex, articulate at the subcordate base, coarsely crenate or crenately lobed on both margins (lobes or crenations 3 or 4 pairs, the basal ones largest), thick-herbaceous, rigid, distantly waxy-glandular above or densely so at the roundish pulvinus, beneath densely white-ceraceous, scales and hairs wholly wanting; veins immersed, freely branched; sori in a narrow submarginal line, nearly concealed by the ceraceous covering.

Type in the U. S. National Herbarium, no. 1,147,823, collected on steep eruptive rocks in open situations near Río Piloto, Sierra de Nipe, Oriente Province, Cuba, July 30, 1914, by Erik L. Ekman (no. 2313). Known also from *Ekman* 6004 and 10011, collected at the same locality in 1915 and 1919, and from a specimen collected in the gorge of the Río Naranja, near Woodfred, in the same province, by J. F. Kemp in August, 1914. The altitudinal range is from 200 to 630 meters.

Notholaena Ekmani is related to *N. trichomanoides* (L.) R. Br., of the Greater Antilles, but is immediately distinguished by its much narrower blades, by its setose stipes and rachis, and by the complete absence of stellate scales throughout.

WASHINGTON, D. C.

Ferns of the Marcy Region

C. S. LEWIS

People who know the Adirondacks know that Mt. Marcy, the Cloud Cleaver, Tahawus, as the Indians called it, lifts its head above the rest of the high mountains which stretch in every direction from this, the highest peak in the whole district. It has been my good fortune to spend several summers in Keene Valley; and, with my son, to climb these mountains and in woods and ravines and along the cliffs to hunt for the ferns of the district. We have had "good hunting" and the story of our finds ought to be shared with the rest of the American Fern Society.

One reaches this district of the Adirondacks from the east by the high road through Elizabethtown, whence north-bound roads carry us to the Poko-Moonshine territory in Essex County near Willsboro. The road to Keene, after reaching the ridge drops down to the Au Sable valley by way of Spruce Hill. Here one finds a swamp which yielded fine specimens and some interesting *Thelypteris* (*Dryopteris*) hybrids. At the foot of the hill the dirt road takes one up into Keene Valley and at last to the Au Sable Lakes. Towering over them to the north is "The Range," a series of high peaks which lead by stiff trails to Haystack and Marcy. North from Marcy one finds McIntyre, one of the great mountains of this whole district, with steep cliffs and stiff ascents, separated from its neighbors by the Avalanche Pass on the one side and by Indian Pass on the other. Out beyond lies Heart Lake, and still further Lake Placid. From Placid, back by way of North Elba, we come along the Cascade Lakes by the State Road to Keene, and after a bit find ourselves at the foot of Spruce Hill again.

This, roughly described, is our territory; high mountains whose summits in most cases lie above the tree line, their sides clothed with hard woods on the lower levels that yield to birch and spruce and balsam as one climbs to the top. In many places we find great cliffs and precipices as well as lowly ledges which afford fine footholds for the rock-loving ferns. The rocks of this territory are ancient, Marcy being one of the oldest places on the earth according to geologists. But one finds no limestone in the territory and so we miss the lime-loving ferns. In spite of this limitation the numbers are surprising and interesting and unusual ferns call us to hunt them out.

Under date of September, 1924, the New York State Museum published an Annotated List of Ferns and Flowering Plants of New York State. This was prepared by Dr. Homer D. House, State Botanist, and is based to a large extent upon the collections and records available. The section of the ferns was edited by Dr. Maxon, our President, and is an exceptionally interesting record. It is far from a mere list. In the account which follows I am using the nomenclature of this Annotated List and have accepted the same order of species. I have also had the advantage of a careful check-up on the rarer ferns by Dr. House and Mr. Weatherby to both of whom I want to express my thanks.

We found in swamps and wet meadows, and not infrequently, fine specimens of the Adder's Tongue (*Ophioglossum vulgatum*). There was considerable variation in size; generally, from our experience, due to the depth of the grass in which the fern is growing. We have found this same characteristic in many other places.

The *Botrychium* group was most interesting. On the sides of a path along an old trail leading up Big Slide, and especially in a grassy place where the trail crossed

a small brook, we made, this summer, some interesting finds. *B. neglectum* Wood (*B. matricariaefolium* Milde, in part, or *B. ramosum* (Roth) Aschers, in part), was frequent. We found it small, we found it large. One of our specimens, found down in the valley, measures at least a foot in height. Some of the smaller plants up on the trail approximated the forma *gracile* described by Dr. House, though he thinks they are rather small or dwarf specimens of the *B. neglectum*. But best of all we found several specimens of the lance-leaved grape fern, *B. angustisegmentum* (Pease & Moore) Fernald, which seems to be hitherto recorded in the higher Adirondacks only once, and that in the North Elba report of Dr. Peck. Neither this nor the *B. neglectum* had been reported save in this one instance by Peck from the higher eastern Adirondack region, but Dr. House writes that he "has reason to believe that it (*B. neglectum*) is common there," at least it is rather locally common in North Hudson, Newcomb and Long Lake townships. With this our own experience, in Marcy district, would agree.

The *obliquum* group we found fairly abundant. In one dry pasture, above John's Brook, the ground was full of the plants, and most of the variations should be reported from the district. *B. obliquum*, *B. dissectum* and *B. silaifolium* were common. The var. *oneidense*, of the first-named, and *B. matricariae*, were exceptional. There were no stations here of *B. simplex*, though my son found it near Willsboro in the lower mountains, and Dr. House tells me it is really common in Newcomb Township. *B. virginianum* was frequent, but we were too late to find it in proper fruitage, and so could not be sure of the variations described by Butters, though I feel confident that early July would disclose one or two of them.

The *Osmundas* were all present, though we did not find the variations of the cinnamon fern. *B. regalis*, var.

spectabilis was less common than its cousins, *O. cinnamomea* and *O. Claytoniana*. We found it by Chapel Pond, and in a wet spot on the lower reaches of The Twins. So, too, we found quantities of *Onoclea sensibilis* with an occasional example of var. *obtusilobata*. And there were splendid stations of *Pteretis nodulosa*.

The *Woodsias* have always appealed to us, and many, many times have we hunted for them. This is the richest district for them we have ever visited. Along the exposed rocks and pretty constantly, one will find the Rusty Woodsia, *W. ilvensis*. But over in Avalanche Pass we found our treasure trove, The day was wetter than one can describe, every ledge and cliff showed a waterfall; but what cared we! With a shout of joy my son called me to see what he had found. It was *Woodsia glabella*, large plants and many of them. The older lists had given it at Avalanche Pass, so we were on the look-out for it; but that did not lessen our rejoicing when we saw the smooth green stems and the beautiful plant clusters, which by their shape reminded us of the maiden-hair spleenwort. Our rejoicing was the greater when we learned that further study of the Peck specimens in the New York Museum, on which the older record was based, had proved them to be not *W. glabella* but *W. alpina*, and that there are only two other recorded stations in New York, one near Little Falls, now extinct, and one in the Catskill Mts. (see Mr. F. W. Kobbé's note on page 29. below). We soon found *W. alpina*, two small plants, which did not seem to survive the winter, for we could not find them again this past summer. The *Woodsia alpina* is also reported from the Cascade Lakes (formerly Edmonds's Pond) but we did not find it there. The Obtuse Woodsia we did not find in this territory but my son found it near Willsboro. Under the cliffs on The Twins we found a peculiarly cut form of the Rusty Woodsia,

unusually large, which "has all the cut and habit of the *W. obtusa,*" but is definitely not that plant. What it is is still a matter of doubt. It is clearly closely akin to, if not a variation of, the *W. ilvensis.* There were two large stations of it, and not far away from it, *i.e.*, within ten feet, other stations of the normal *W. ilvensis.*

The bladder ferns, *Filix fragilis* and *F. bulbifera,* were present, and fairly frequent. The fragile bladder fern was, as usual, exceedingly variable according as it grew in wet or damp places. On the rocks of The Twins and also on the big cliff over Cascade Lake we found a boreal form which is unusual but "matched by several others from the northern part of the state." Its appearance is quite unlike the normal fragile bladder fern.

Along the side of the trail through the Indian Pass we found wonderful specimens of Braun's Holly fern, *Polystichum Braunii.* Some of the fronds were, by measure, at least three feet long. The fern was abundant in a small area. So too it was in a deep gorge on the side of The Twins, and up in the meadow below the Au Sable Lakes. Occasional specimens were found in the Avalanche Pass. Its cousin, *P. acrostichoides,* is common all through the territory, with interesting variations in margin, passing from the smooth edges to the deeply cut form, forma *incisum.*

Of the Lady ferns one naturally finds only the northern form, though there are several of the variations of this. We have identified *Athyrium angustum:* var. *elatius;* var. *rubellum;* forma *elegans;* and forma *confertum.* The only other Athyrium we found was *A. thelypteroides,* but we would note that we saw both sorts, the small light green form which is so like a young lady fern, and the large dark blue-green fronds covered with large sporangia, whose white indusia justify the name, Silvery Spleenwort, and make it a very different

looking fern from its smaller relation. The brake, *Pteridium latiusculum*, the maiden hair, *Adiantum pedatum*, and the hay-scented fern, *Dennstaedtia punctilobula*, are all present rather abundantly and without notable variation. So, too, we found lots of the *Polypodium virginanum*, to give the polypody its newer name, both the normal frond and the forms *acuminatum* and *deltoideum* (cf. Fernald, Rhodora 24, p. 141).

We did not find the walking fern, *Camptosorus rhizophyllus*, but I saw this summer, in a collection made in Keene Valley many years ago, a specimen which was undoubtedly this fern and reported as found near the Au Sable Lakes. Perhaps another year we, or some one else, may be able to check this and re-discover the station. It would be most interesting. But on the cliff below the Lower Lake, I found late this summer a fine station of *Cryptogramma Stelleri*, which we also found on the big cliff by Cascade Lakes. It had been reported from the latter station by Dr. Peck, and is recorded in the Bulletin under the name of Edmonds Ponds. Neither of these cliffs are limestone.

I have left to the last the most abundant of the Adirondack ferns, those of the genus *Thelypteris*, or, as it is more commonly known, *Dryopteris*. The floors of the hardwood forest, especially where the hemlocks mingle with the other trees, seem, at times, fairly carpeted with the Oak fern, *T. Dryopteris*; and the wet banks on roadside and by the brooks have even thicker mats of the long beech fern, *T. Phegopteris*, with plants, sometimes, so large that one is sure it is the broad beech fern. But a careful examination proves one mistaken, and *T. hexagonoptera* is not found in this territory. There are the usual and frequent stations of the marsh and the New York ferns, *T. Thelypteris*, and *T. noveboracensis*, but we have never found the kindred *T. simulata*, the Massa-

chusetts fern, in the Adirondacks. When we come to the subgenus, *Dryopteris*, we have first to report *T. fragrans*. This we found, as Peck and others before us had done, at Avalanche Lake, but only there. It is found in scattered clumps along one special cliff so far as our records tell. The crested shield fern, *T. cristata*, was fairly frequent, in suitable locations; as was also *T. Boottii*. In the swamp beside Spruce Hill we found a good deal of *T. Clintoniana*, as well as of the Boott's fern with several hybrids. My son found Goldie's fern, *T. Goldiana*, on Boreas Mountain, south of Au Sable Lakes at an altitude of 2,500 feet. This is really out of our territory southward. The marginal shield fern is found in most of the district, but is not very common. The abundant fern is the spinulose shield fern, with its varieties. *T. spinulosa* proper is frequent along the streams and in moist places. *T. intermedia*, or, if you prefer, *T. spinulosa*, var. *intermedia*, grew everywhere and of all sizes. Some of the plants were sufficiently different from the ordinary widely scattered forms to make one wonder at first if it were a new variation. So soon as we began to get into the higher elevation the "Spreading shield fern," *T. spinulosa* var. *americana* appeared and grew more and more abundant as we came toward the tops of the mountains. We recall one piece of trail up Giant where all three grew together, and another place on the top of the "amphitheatre" on the Gothics trail where the ground was literally covered with the great broad fronds of the American form of the "spreading shield fern." There is lack of uniformity in this fern, unless we did not see aright, for sometimes we found indusia which, under the microscope, showed glands in place of the usual smooth indusium of the normal var. *americana*.

Among the hybrids we found, in the swamp to which I have already referred or elsewhere, *T. intermedia* ×

spinulosa; *T. Clintoniana* × *spinulosa*; *T. intermedia* × *marginalis*; *T. Clintoniana* × *intermedia*; *T. Clintoniana* × *marginalis*. To these should be added, technically, *T. Boottii*. It is more than probable that some of the crested hybrids will be found, but we have not yet done so.

Counting varieties and forms this makes fifty-three different ferns we have listed in the higher Adirondacks. To them should be added from the lower mountains near Willsboro, *Botrychium simplex*, *Woodsia obtusa*, and *Asplenium trichomanes*. This latter fern I also found in fair abundance in the woods on Split Rock Mountains which abuts into Lake Champlain.

We have also found in the Keene Valley section the following "Fern Allies": *Equisetum hyemale*; *E. sylvaticum*; *E. arvense*; *E. arvense* forma *pseudosylvaticum*; *E. scirpoides*; *Lycopodium annotinum*; *L. complanatum*; *L. complanatum Chamaecyparissus*; *L. lucidulum*; *L. clavatum*; *L. obscurum*; *L. alpinum*; *L. sitchense*; and *Selaginella rupestris*.

The Quest of Thelypteris augescens

GEORGE L. MOXLEY

Several years ago I noted, growing in a yard in Los Angeles, a very attractive fern which I decided must be what Underwood was then calling *Nephrodium patens* and later called *Dryopteris patens*. I tried to learn where the plants had originally been secured but no one seemed to know. Later I saw a single plant that was said to have been collected in Eaton Canyon, which cuts in between Mt. Lowe and Mt. Wilson, in the San Gabriel Range. It had also been reported by Parish as having

been collected near Santa Barbara, and that seemed to be the extent of available information. I looked for it in Eaton Canyon but failed to locate it and came to the conclusion that either the person had mistaken the Canyon or misinformed me as to the location, or collected all there was.

Then, one joyous day, my friend, Mr. Robert Kessler, brought me two magnificent fronds of a fern entirely new to him and which proved to be my long-looked-for plant. He found it in Roberts' Canyon, quite a bit to the east of Eaton Canyon, where he said there was "lots of it." Later he reported it from Fish Canyon, in the same neighborhood, but it had never been my lot to be with him when he found it. So we made arrangements to go in quest of it and, on November 8th, 1925, in company with Messrs. L. E. Martindale and M. E. Palleske, we motored to Fish Canyon where he had last collected it. After going some distance up this canyon we climbed over a steep ridge into an un-named canyon just west of it and found the fern growing quite plentifully.

It is a very beautiful fern with lanceolate, bipinnate fronds abruptly narrowing to and terminating in a long attenuate cauda which is simply pinnate and frequently as long as the pinnae. The fronds are usually drooping although some of them are fairly erect when growing in the sun. Some fronds are as much as four feet in length although they average much less. I noted some that were fully developed, carrying the characteristic shape and fully fruited, that were less than a foot high.

It grows in wet ground in shaded canyons and may be more common that has been supposed. All that we saw

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DESCRIPTION OF PLATE

Thelypteris augescens (Link) Munz & Johnston, center, and *Woodwardia Chamissoi* Brack., upper and left. Photo by L. E. Martindale.

grew in company with *Woodwardia Chamissoi* Brack. In some places the Woodwardia grew higher up on the canyon wall and the Thelypteris below, and in other places both were intermingled. In one place *Pteridium aquilinum* (L.) Kuhn, var. *pubescens* Underw. was mingled with the other two. All along the canyon stream there were large patches of *Adiantum capillus-veneris* L. growing on the dripping rocky banks. The early rains had started the *Pityrogramma triangularis* (Kaulf.) Maxon, the Pellaeas and many mosses and hepatics. But the only thing I collected on this trip was this exquisite fern, now called *Thelypteris augescens* (Link) Munz & Johnston. There was not time to do more and get out of the steep canyon and on the trail before dark.

LOS ANGELES, CAL.

Ferns—Facts and Fancies about them—VIII.

F. E. CORNE

Mounting specimens is a delicate operation which a novice should begin seated comfortably at a good sized table with everything which may be required for the purpose within easy reach, for to stop in the middle of the work in order to look for some forgotten article is almost certain to result in disaster. These necessary things are: Mounting sheets 11½ x 16½ inches of medium or heavy cardboard (or light weight may be used for very small ferns). A bottle of fish glue. Some prepared gum tragacanth. A pane of glass the size of the mounting sheets. A flat paint brush with long bristles, not less than ¾ inch wide, for spreading the glue. One or two small brushes. Some sheets of white

blotting paper. A quantity of narrow strips of gummed paper or of physician's transparent silk plaster for fastening down obstreperous stems. Some water in a bowl. A small sponge or a piece of soft old linen. A small pair of scissors. Small pincers. A board, atlas or anything large and heavy enough to cover the newly mounted specimen sheets to serve as a weight. Labels, either printed which come ready to fill in or a small block of paper on which to copy data, in ink, or of gummed paper cut to order at a printer's. A small quantity of vinegar for thinning out the glue, or printer's and plasterer's glue may be used for this purpose, or some of the gum tragacanth. Never thin glue with water.

Almost all of these things can be found at a botanical supply store, and it is well to buy at least the papers and the glue at such a place as one is then sure to get just the right kind. Felt paper for pressing and cardboard for mounting come already cut to regulation size. Gum tragacanth is to be had at a drug store in a dry state and a small quantity will go a great way. Soak about a dessert spoonful in a large glass of water until soft, then boil a short time until transparent and of a jelly-like consistency. If then a few drops of some essential oil, like oil of cloves, is added as preservative, it will keep for a long time in a cool place. I find gum tragacanth invaluable for mounting small delicate ferns instead of glue, and also for thinning out the glue. Beginners are kept to think that mounting sheets 11½ x 16½ inches are too small for any but very small ferns and will be tempted to use large sheets for large ferns. But a very little experience will prove that the uniform regulation size is the best. A whole plant a foot or more high makes an attractive specimen on one of these sheets, or a single frond twice that length, if slender, can be arranged

slanting with folded over tip to look very well. Several small specimens can be artistically mounted on one paper if desired. If possible, and especially if unlike, a sterile and a fertile frond of the same plant should be mounted together. If the leaves are similar in shape one of them may be arranged to show the upper side, the other the under with its spore cases. Or a very large frond may have a pinna or two turned over to show the reverse side. Very large mounted sheets displaying whole good sized ferns, with dried or painted grasses surrounding the lower part of the stems as if growing are sometimes seen in natural history museums where they are appropriate as well as interesting.

The pane of glass can of course be purchased at any glazier's or hardware store and any kind with a smooth surface will answer. As I had a handsome pane of plate glass presented to me for this purpose I had a box made for it half an inch higher inside than was necessary for the glass, and with a sliding lid so that when not in use the cover can be put on without disturbing or touching the glue. In case of transporting it at any time, the space can be used for padding. Also as the box with glass is quite heavy it makes a satisfactory weight for freshly mounted specimens.

When ready to begin the work of mounting with the large brush spread some of the glue, properly thinned out, very evenly over the pane of glass, then carefully lay on it the frond to be mounted. With a soft clean brush or blunt stick gently press down the pinnules and stems to be certain that each part is coated evenly with glue on the under side, better too much than too little. Now lift the specimen with the pincers provided for the purpose very carefully by the stem or the rachis (midrib) and if too much glue has adhered lay it for a second

on a sheet of blotting paper to remove the surplus. Then lift it again and place in any desired position on the mounting sheet. If this appears to be a difficult matter and you are anxious to have it just right, lay it glued side up on a clean paper just the size of the mounting sheet and when arranged to your satisfaction lay the mounting sheet upon it and press gently all over it. Now remove with the damp cloth or sponge any superfluous glue or gum, fasten on the label already copied in ink, or at least leave it near the fern to which it belongs, place over all a sheet of blotting or oiled paper, then the weight and leave it there until quite dry. Several sheets may be placed under the weight at the same time.

If, unluckily, one of these mounted specimens should prove altogether unsatisfactory and you desire to change it, though a delicate matter requiring great care, it can sometimes be successfully removed from the paper by applying steam to the glue through the under side of the paper by means of a wet cloth and a hot iron.

As the dried leaves are exceedingly brittle, care must be taken even after they are mounted to keep them from injury. For a few specimens a portfolio may answer, but by far the most satisfactory thing in which to keep them is a box which comes ready made for the purpose exactly the right size with a drop front convenient for handling and capable of holding over a hundred sheets.

Finally, when you have finished the task of mounting all that are desired for your collection, I would suggest that, as you have probably gathered many more fronds than you need, you select a few of the most perfect to keep for possible exchange, and throw all the rest away, except of course any very rare species. This will save future trouble, as a collection of this kind seems to grow almost miraculously and unless kept down will soon overflow every available place. Anyone who has truly

felt "the lure of the fern" will continue to collect and to exchange specimens with others at every available opportunity, and his knowledge and interest in this fascinating branch of botany will constantly increase. There is a fascination too in looking over one's collection from time to time bringing back to mind as it will many happy hours spent in the open, whether alone or with congenial companions. The larger specimens, cut up and folded over, may only be satisfactory or interesting as herbarium specimens, the smaller ones however, if artistic taste has been shown in arrangement and mounting, will to a great extent have retained their natural beauty and gracefulness and thus each will indeed have become "a thing of beauty and a joy forever."

CAMBRIDGE, MASS.

MARSILEA VESTITA (HOOK. AND GREV.) IN WESTERN CANADA.—According to the standard taxonomic works, the heterosporous fern *Marsilea* should not occur in Canada east of the Rocky Mountains (except at one station in Alberta). The writer was therefore surprised to receive during the past year specimens of *M. vestita* from three widely separated localities in Saskatchewan. The distribution of this species is given as "Ia. and southwestwards" (Gray), or "B. C.—Ia.—Ark.—California" (Rydberg).

The three stations in Saskatchewan are located as follows: (1) Glen Kerr, in the southwestern part of the province, west of the city of Moose Jaw; (2) Dumferline, in central Saskatchewan, just west of Saskatoon, and (3) Juniata, farther west in the central part of the province. The latter locality was visited and specimens were collected there.

Subsequent examination of Macoun's Catalogue of Canadian Plants showed that he had found the species growing in the Cypress Hills of Southern Alberta. It was also collected by him later at Spur Creek (Geological Survey No. 14,209). Also, Professor Jackson, of the Manitoba Agricultural College, states that the species was recently found at Froude in Southeastern Saskatchewan near the Manitoba boundary. It therefore seems probable that this species is to be found right across Saskatchewan and Alberta. Apart from *Azolla caroliniana* which has been reported from Lake Ontario, it seems to be the only Canadian representative of the heterosporous ferns east of the Rocky Mountains.

In all three localities in Saskatchewan, the plants form dense mats with creeping stems in low spots in ordinary wheat fields. In some cases the whole field including these low spots is cultivated and planted with cereals except in wet years, when the low spots may escape cultivation, because the soil is too wet at planting time. Approximately every third year, however, the fields are summerfallowed and then the whole area receives frequent cultivation during the summer.—W. P. THOMPSON, *University of Saskatchewan.*

BOTRYCHIUM DISSECTUM.—Gladewitz and Farwell, while botanizing near Disco, Michigan, found a considerable colony of this species in a small copse not far from the town. It was somewhat early for the appearance of the fertile fronds. A good many had the sterile frond of the preceding year, now yellow and wilted, still attached. Observers for the most part seem to think that the dissected form, the nomenclatorial type, is a sterile mutant of the variety *obliquum*, supposed to be the genetic type. A close inspection of the copse showed that the dissected form was about ten times as frequent as the

non-dissected form and well distributed through it. At this time there were less than one-half dozen plants of the dissected form with fertile fronds still green and not fully unrolled. Of the other kind, there was not a single fertile frond and the sterile fronds seemed to be too immature to produce them this year. As far as this colony is concerned, if there is any mutation going on, it would seem that the non-dissected form is the mutant.—O. A. FARWELL, *Detroit, Mich.*

ANOTHER STATION FOR LYCOPODIUM PROTHALLIA.—In connection with work in the Biology Department at Wheaton College, I can report another station for the occurrence of *Lycopodium* prothallia. In November, 1924, I found in two places in the vicinity of Wheaton College, Norton, Mass., prothallia of *Lycopodium obscurum* var. *dendroideum*. Both these spots had fairly open growth—the first of white pines, and the second of oaks. The prothallia were all in a wood loam which extended down for about one and one-half inches and which contained hyphae. Beneath this loam was a yellow soil without hyphae. No prothallia were found in this soil, but all were in the loam at an average depth of about one inch. The prothallia are of the characteristic shape described by Spessard (Bot. Gaz. **74**: 392–412). Prothallia were found of various sizes, both with and without sporelings.—ROSELLA S. AMES, *Norton, Mass.*

LYGODIUM PALMATUM IN BERKSHIRE COUNTY, MASS.—In the last number of the JOURNAL it was stated that at a meeting of Fern Society members at Monterey, Berkshire Co., Mass., the party were informed of the existence in that town of a small colony of climbing fern. This fern was reported from the nearby town of Becket by Professor Dewey in 1829; but no specimens from there are

known to exist, and the species was excluded from Hoffmann's recent Flora of Berkshire County. The Monterey station furnishes the only verifiable record from New England west of the Connecticut valley; some detail in regard to it may, therefore, be worth setting down.

According to our informant, it was discovered about fifty years ago by a woman familiar with the fern in the vicinity of Hartford. She so successfully impressed on the few who knew of its existence the rarity of the plant that, until now, they have kept their knowledge strictly to themselves. When discovered, and for years afterward, the colony covered about a hundred square feet; owing, probably, to the growth of the forest over it, it is now reduced to a single surviving plant, and its extinction may be expected within a short time. A fragment has been taken as evidence, and will be deposited in the Gray Herbarium. The soil about Monterey is for the most part calcareous, but on the hummock where the fern grows gives a specific acidity of 30 on Dr. Wherry's scale.—C. A. WEATHERBY, *East Hartford, Conn.*

ASPLENIUM VIRIDE AND CRYPTOGRAMMA STELLERI IN UTAH.—I notice in the current number of the *Bulletin of the Torrey Botanical Club*, in the Index of American Botanical Literature, an article by W. R. McColl entitled "What unusual fern finds have you made? Please tell us." This prompts me to tell!

During the past summer I taught a class at the Alpine Summer School of Brigham Young University at Aspen Grove, Mt. Timpanogos, the subject being "The Algae, Bryophytes, and Pteridophytes of Timpanogos." The course was partly morphological, partly taxonomic. The students were to make an intensive survey of the region (which extends from about 6,800 ft. altitude to over

12,000) for the forms represented in the above title. During the course of this survey we collected two ferns new, I think, to the flora of Utah: *Cryptograma Stelleri* and *Asplenium viride*.—Specimens of both have been sent to the U. S. National Herbarium and of the Asplenium to the New York Botanical Garden. Our collection of *Cryptograma Stelleri* was meager, but I hope to get more of it next year.—A. O. GARRETT, *Salt Lake City, Utah.*

ONE WAY TO GROW FERNS—Certain of the smaller Aspleniums and the walking fern will grow on sour soil. I have found it interesting to grow these ferns in the following way. A mixture of sand and wood loam should be heated in order to kill seeds and spores. This soil should then be placed to the depth of about one inch in fish globes. Fresh spores of *Asplenium platyneuron*, *A. pinnatifidum*, *A. Trichomanes* and *Camptosorus rhizophyllus* can be sown on the moistened soil. Do not cover the spores. On the top of each globe put a piece of glass to prevent evaporation.

The spores will begin to sprout in from two to four weeks and will develope prothallia in about six or eight weeks. I find that I have better success if I wait several years or until the sporophytes are nearly mature before transplanting them to other fish globes. They can be transplanted then without wilting. The species that never grow to any great size can be put into fish globes, and ebony spleenworts can be put into tall, wide-mouthed bottles.

There is little or no trouble involved in all this. The globes do not have to be watered oftener than once in ten weeks, and the only care to be observed is that the globes must not be put in sunshine but kept in light as nearly like that in which the fern grows normally as is possible.

I have one pinnatifid spleenwort that was put into a fish globe about six years ago. It has dropped spores and young sporophytes have developed in the globe. At present it has a fresh leaf. The second lobe from the stipe on the left hand side as one looks down from above is very large. It is pointed and is almost as large as the rest of the leaf. I have seen references to such leaves of *Asplenium pinnatifidum* in the literature.—BLANCHE MCAVOY, *Cincinnati, Ohio.*

THE SMOOTH WOODSIA IN NEW YORK.—There has apparently been considerable uncertainty as to the exact status of the Smooth Woodsia (*Woodsia glabella* R. Br.) in New York State. Dr. House, in his "Annotated List of the Ferns and Flowering Plants of New York State," 1924, includes this fern as known only from Little Falls, New York, George Vasey, July, 1847, in Sartwell herbarium, Hamilton College. He states that the specimens in the Sartwell herbarium have recently been reexamined and are this species without doubt, but adds that there is no record of its having been collected in this State since, although more than one collector has carefully examined the Little Falls region. The specimens by Peck from Lake Avalanche, he says, prove to be *W. alpina.* The latest edition of Gray's Manual includes New York in the range of the species, but without comment. Clute, "Our Ferns in their Haunts," gives the range as from Northern New York, and Waters in "Ferns" says that it has about the same geographical range in New York as *W. alpina,* adding that it lives on moist rocks or even where the spray of water falls reaches it. Taylor in his "Flora of the Vicinity of New York" does not include the Smooth Woodsia. However, he, as well as Dr. House, appear to have overlooked the record for this plant in Gilbert's "The Fern

Flora of New York,'' published in The Fern Bulletin, October, 1903, Volume XII, page 102, where this Woodsia is reported from Haines' Falls on the authority of Professor Peck.

In the latter part of August, 1921, while collecting in Greene County, New York, near Haines' Falls, I explored a deep ravine where sheer dripping cliffs with the talus extending almost to the bank of the stream formed an agreeable prospect. Here I found on the rocks the slender cliff brake (*Cryptogramma Stelleri* (S. G. Gmel.) Prantl) not reported by Taylor from New York in his Flora, although the locality is within his area, and not reported by Dr. House from this locality. This location of the slender cliff brake was, however, previously known, as there is mention of it in the Preface, page 8, to Dr. Kelly's ''Some American Medical Botanists,'' and I am advised that there is a specimen from Haines' Falls collected by Mrs. Mary L. Stevens, June, 1895, in the Gray Herbarium at Cambridge. Growing near the slender cliff brake were very bleached specimens of the long beech fern (*Thelypteris Phegopteris* (L.) Slosson) and, almost concealed in the fissures, a small fern in some abundance at this particular spot, which I at first supposed might be *Asplenium viride* Huds. A glance at the text books and manuals, however, soon assured me that I had found the Smooth Woodsia, and my identification was subsequently confirmed by Mr. C. A. Weatherby, to whom I sent a specimen.

Last summer, August, 1925, I again visited this station, but although I made a careful examination lower down the gorge, I was able to find specimens only at the original location found by me in 1921. I did, however, find additional patches of the slender cliff brake scattered through the ravine.

Samples of the rock on which the Smooth Woodsia grows have been sent by me to the Department of Geology and Mineralogy at Columbia University and have been determined as shale, having a percentage of approximately two and a half per cent of lime (CaO) which, I am advised by Professor Colony, is quite normal as to lime percentage for shales. The rocks on which the cliff brake grow contain approximately the same amount of lime.

The gorge, although difficult of access, is visited by a good many persons during the summer months. Should the locality be found by others, I urge that the Woodsia be collected sparingly as the plants are apparently confined to a very limited area at this station.—FREDERICK WM. KOBBÉ, *New York City.*

American Fern Society

The botanical library of the Peabody Museum of Salem, Mass., contains volumes 14 to 18 inclusive of the *Fern Bulletin.* Any member of the Fern Society willing to contribute toward completing the files of this magazine will help a worthy cause by sending any of the missing volumes to the Museum, in care of Albert P. Morse, Curator of Natural History, who has recently joined the Society.

New members:

Barnes, E. H., Taxation Dept., G. P. O. Building, Perth, Western Australia.

Brooks, Maurice G., French Creek, W. Va.

Brown, Herbert H., 158 Glebeholme Blvd., Toronto, Canada.

Finegan, Mrs. Thomas E., 613 North Front St., Harrisburg, Pa.

Huber, Frank F., Farmers' National Bank, Pennsburg, Pa.

MacCaskill, Allan, Jr., Coleraine, Victoria, Australia.
Morse, Prof. Albert P., Peabody Museum, Salem, Mass.
Paull, Miss Agnes M., Brookdale Farm, Holcomb, N. Y.
Stebbins, G. Ledyard, Jr., 38 Claverly Hall, Cambridge, Mass.

Change of address:

Hall, Mrs. Carlotta C., 1633 La Loma Ave., Berkeley, Cal.
Kobbé, Frederick Wm., 1155 Park Ave., New York City.
McColl, W. R., 921 Fourth Ave. East, Owen Sound, Ont.
Noyes, Miss Elmira E., 912 Brandon Ave., Norfolk, Va.

The date of Mrs. Mary A. Noble's birth was Aug. 31, 1847, not Aug. 13, as stated, through a typographical error, in the last number of the JOURNAL.

Mr. George L. Fisher, 713 Leeland Ave., Houston, Texas, will collect ferns and other herbarium material in southern Mexico, leaving in July, 1926. Fern Society members wishing to make this trip will please communicate with him. All plant zones will be visited, from alpine snows (alt. 14,000 ft.) to the tropics (alt. 0).

The officers' reports for 1925 had not been received at the time of going to press. They will no doubt be on hand for the next number.

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E. J. WINSLOW C. A. WEATHERBY

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American Fern Journal

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Saving the Hart's-tongue

The vicinity of Jamesville, Onondaga County, New York, is classic ground to both the geologist and to the botanist. Across the outcropping Onondaga limestone on both sides and above the present level of the valley of the Butternut Creek and almost at right angles to the present north and south placement of the valley are the famous post-glacial gorges caused by the eastward flow of the outlet of the post-glacial lake. In 1807, Pursh discovered the Scolopendrium fern near Geddes, southwest of the city of Syracuse. In 1830, William Cooper found the fern at Chittenango Falls. Meanwhile the two localities where the fern was most abundant remained unknown until found by Lewis Foote in 1866 near Jamesville, and in the same year by J. A. Paine at Little Lakes (Green pond and White or Blue lake) about a mile east of Jamesville.

The two small lakes, Green lake (2 miles west of Jamesville) and Green pond (1 mile east of Jamesville) occupy the plunge basins of the extinct post-glacial rivers, the beds and gorges of which form such a conspicuous element of the local geology. It is probable that Rafinesque visited one of these small lakes in 1826 (Life of Travels, page 82) when in company with Eaton he speaks of visiting several localities in central and western New York, "and a small singular nameless lake, an ancient volcanic crater, without outlet." He states

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that he had full time to collect and carry numerous specimens, but unfortunately lost most of them afterwards. It was indeed "unfortunate" if he did visit one of these lakes, as seems probable, that he should have associated stratified limestone formations with volcanic phenomena, curiously so in view of his familiarity with the volcano of Etna.

Probably neither botanist nor geologist has ever visited this remarkable locality without observing with keen interest the evidences of the rugged forces of nature which have so deeply impressed their power upon the visible landscape. Especially does the botanist, as he explores the rock strewn pot-holes and gorges, feel that he has been transplanted suddenly to something akin to a different world. It is not strange, therefore, that the botanical literature of this section of the state contains many references to the vegetation and especially to the ferns of these cool, densely shaded, mossy rock strewn gashes in the earth's crust. Like many another student of botany and geology at the nearby University in Syracuse, I quickly discovered this interesting locality and never tired of exploring its many almost inaccessible recesses.

For our most complete knowledge regarding the fern flora of this region we are indebted to Dr. L. M. Underwood, at one time professor of biology at Syracuse University (*Fern Bulletin* **5**: 53–54. 1897), but we should not overlook the many other contributions to the knowledge of the flora of these lakes and their vicinity made by Mrs. S. M. Rust, H. E. Ransier, Mrs. L. L. H. Goodrich, Miss Mabel R. Hunter, Dr. William R. Maxon, Dr. Loren C. Petry, and others.

A few years ago the region around Green lake west of Jamesville was acquired by the New York State Museum, as part of its program in the preservation of notable geo-

logical formations. This tract is now known as the Clark reservation. It is evident that the public at large, certainly many of those who frequent the park for recreational purposes, have little conception of the value and importance of the conservation and preservation of those elements of wild life, both plant and animal, which form such an important element in the beauty of the great out-of-doors, for while hunting is fairly easy to prevent upon the reservation, the protection of the plants is more difficult and there has been considerable vandalism at the expense of some of the Scolopendrium ferns. It is not, however, a hopeless cause and there is reason to believe that with adequate protection this reservation may become the safe abiding place of the many rare plants which are native to the region.

Botanists in general and fern students especially were not a little grieved to learn that the much larger area east of Jamesville, including Green pond, White lake, and the long rough and irregular escarpment extending nearly to Manlius, had passed into the hands of the Solvay Process Company, whose intention it was to convert this great deposit of limestone into commercial products. The commercial demands for easily available deposits such as this are undeniable, but it must remain as a perpetual blot upon the name of a great corporation with almost unlimited resources, that after learning of the scientific value attached to Green pond, they could not have fenced off a few score of acres surrounding it and left it untouched as a gracious gesture and monument for the future.

During 1924 and 1925 through the interest of many fern students a movement was finally crystallized by Dr. John B. Todd, of Syracuse, for the transplanting of the Hart's-tongue fern from the path of the quarrying operations to safer quarters in the Clark reservation and

elsewhere. This had the sanction of the Vice-President of the Solvay Company, which is about all the interest shown by them in the matter.

It is not the purpose of this account to dwell in detail upon the transplanting operations. It is sufficient to say that Dr. Todd, with the assistance of Miss Nettie M. Sadler, teacher of biology in the Nottingham High School, of Syracuse, and Miss Mary E. Todd, removed and planted elsewhere a total of nearly 700 plants of the Hart's-tongue fern. Most of these plants are doing well in their new homes, some of them remarkably so. A few have suffered from heavy rains and other unforeseen conditions. During the spring of 1924, Miss Mabel R. Hunter, of the department of botany of Syracuse University, assisted by a few students and other faculty members interested in saving the ferns removed about 300 clumps of the Hart's-tongue fern from the path of the quarrying operations to the Clark reservation and elsewhere. Some of the expense of this work was met by the State Museum. A recent inspection by Dr. Todd indicates that considering the difficulties of getting the plants out and transplanting them in new locations the percentage of survivals is truly remarkable. Only those who have attempted to explore the haunts of the Hart's-tongue fern can appreciate what strenuous difficulties and hard work has been involved in this project. Fern students above all owe to these two groups of individuals headed by Dr. Todd and Miss Hunter a debt of gratitude for which there is no visible remuneration. Our sincere appreciation and their knowledge that without thought of reward they have laboriously accomplished something really worth while toward the preservation of one of our rarest species of plants will constitute their chief compensation.

It is appropriate to mention here, also, Mr. H. E. Ransier's recent offer to send to members of the Fern Society living plants of the Hart's-tongue fern. These plants, as will be noted in Mr. Ransier's own account, were for the most part "left overs" from the work of transplanting carried on by Miss Hunter and Dr. Todd and were in immediate danger of destruction. With proper care many of the plants thus distributed by Mr. Ransier should survive. This reminds me of the fact that a recent assistant in my office "discovered" the Hart's-tongue in the woods west of Saugerties, Ulster County, about three years ago. I was not willing to believe them native and inquiry revealed the fact that they had been planted there several years ago by Miss Charlotte Borgardus. There are doubtless scores of places where the fern will survive if carefully planted, and a careful record should be kept of the plants distributed by Mr. Ransier and their survival where planted out in natural surroundings. What Mr. Ransier's modesty does not permit him to add is that the money received for these plants, some $30.00, has been turned in to the Fern Society for use in illustrating the JOURNAL.—HOMER D. HOUSE, *Albany, N. Y.*

Richer than millionaires! happier than Kings! envied by multitudes! may be said of hobnobbers with Hart's-tongues. What joys, suprises, and pleasures come with twenty-five years' close association with them.

How implicitly did we believe the old botany that said they grew *only* at Chittenango Falls, N. Y. How we scorned the young Miss, who said they grew elsewhere, when she saw a potted one in the store window labelled, "Chittenango only"!

What thrills, when, with a young companion we camped out three nights under a double poncho tent in the Jamesville woods right beside the Hart's-tongue col-

(Photograph by H. E. Ransier)

The Hart's-Tongue as it was at Jamesville

onies. How, many seasons afterwards, we camped in a well-furnished tent on the identical spot, even if cattle did visit the place in our absence, eating all the vegetables and swallowing whole a large chunk of salt pork, bringing visions of an animal choking to death, until the farmer to whom I reported the matter laughed heartily and said it was a good remedy for loss of cud! How fearful were we once, when a strange noise approached our camp until it became an awesome roar—nothing but heavy rain upon the forest foliage, without a breath of wind, approaching unannounced in any customary manner. No such thunder and lightning have I ever experienced as one night, while in camp there with my wife about a year after we were married. The storm surged back and forth with seeming cloud-bursts, nearly the whole night long, but our tent with ample and waterproofed fly kept out every drop even if we were robbed of our sleep!

We have even found it difficult to get to sleep sometimes from the incessant calls of myriads of katydids all around our tent, with occasionally one inside. The volume of their cries on an otherwise calm and peaceful night is beyond belief.

Imagine, if you can, the shock that came to me a year or so ago, on visiting the ravine I considered the site of the choicest of Hart's-tongues, to find every tree and shrub had been cut down and a great bank of newly deposited quarrying refuse dumped right over and completely burying all! Not a fern left! (I have since learned that Dr. Todd, of Syracuse, was aware of the impending danger in time to transplant many hundreds of these ferns to state reservation lands.)

A visit to the old camp site one-eighth mile away showed it not yet covered by rock though nearly so. Road beds had been graded along the top of the south

bank around the little lake and railroad spurs had already been established and used. Soon, inevitably, the colonies of Hart's-tongues in the talus below would be obliterated by train loads of refuse from the quarrying operations on a grand scale close at hand. So when it was suggested to aid in saving these ferns by passing them on to others, in spite of old ties and associations, we were persuaded to remove the very ferns we had so long tried to protect.

On a late fall day, of soft and yellowed light, evergreens contrasting with brilliant autumn leaves; with hisses of escaping steam; shrill engine whistlings from the quarrying operations; the baying of hounds and occasional hunter's gun shot echoing back and forth, and voices of pleasure seekers far below, we began the work of rescuing the ferns. With trowels, old newspapers, and plenty of rubber bands, the plants are easily lifted, wrapped, and fastened. Not so easily are they carried up the steep slope over loose rocks covered with mosses, or damp freshly fallen leaves, to the crest above.

The monotony of the work is varied by inspecting a tiny cavern quite near the top and endeavoring to photograph the great number of Hart's-tongues which thickly dot the surface of fissures for six or eight feet back from the opening, which is about six by fifteen inches. A prolonged time exposure with small diaphragm was necessary but when the exposure had been completed, the lens was found completely steamed over by a moist, out-flowing current of air. More exposures, with kodak farther back to escape this damp drift, proved most unsatisfactory.

Resuming collecting, we worked till night approached and the last load to the auto found us picking our dangerous path through the darkness, and speeding homeward, the lights of Fayetteville and Manlius, both visible

at the same time, and an orange, Hallow-e'en-like moon rising in the east, made a sight worth seeing.

So-called "snake caps" were very noticeable on this occasion and having a desire to establish a few small ferns and mosses indoors in an old aquarium (12 x 12 x 20 inches, covered with plate glass to retain moisture), I took a number of the scarlet cups for contrast with the greens, and they were a success, novel, brilliant, and attractive; a few "squaw berries" and "wintergreens" both in full fruit gave a further variety. The snake caps faded about Christmas and so New Year's Day, with a foot of snow on the ground, found us at the Hart's-tongue station, with thermometer, kodak and an old auto license plate for snow scraper.

The thermometer showed a temperature of 49 degrees in the tiny cavern, and the vicinity from 50 to 100 feet away seemed to be influenced by warm air seeping out from inner recesses, for though facing the north, the snow only remained in patches where it rested on logs, rocks and tufts of grass or moss. This is the immediate neighborhood some one has called the "most exposed station of the Hart's-tongue"—an apt designation.

Here the snake's cap fungi were also exposed and enough were procured to renew my inside garden.

The offer in the FERN JOURNAL brought letters, special delivery, and telegrams at once. They came from all classes of individuals; from gardeners, park officers, teachers and colleges. Repeat orders also came later, and I wish to express my appreciation of the character of these correspondents; I know of no finer lot of people than those composing our Fern Society. Fairness, appreciation, co-operation, gratitude and sympathy stood out pre-eminently as on earlier occasions, in pleasant contrast with one's daily business experiences.

Orders came from thirty-five individuals in the follow-

(Photograph from the Brooklyn Botanic Garden)

Hope for the Future; young Hart's-Tongue, about 8 Months old, in an 8-inch Pan.

ing states: New York, Pennsylvania, Maryland, New Hampshire, Massachusetts, Vermont, Rhode Island, Connecticut, Ohio, Wisconsin, Washington, Illinois, Maine, New Jersey, California, Nebraska, and Missouri. About $10.00 was spent for postage. One pleasant feature of this distribution was the large number acknowledging receipt of ferns in good condition, commenting on manner of packing and expressing appreciation. About one-third of this number mentioned have fern gardens.

Although not formally a member, the Society owes Mrs. Ransier more than a little credit in this distribution, for she can make "Lizzie" "gid-ap" and respond to her "whoa" while "Lizzie" pays no attention to me.

Besides, she enjoyed every trip and shared in all the work and was ready for more. Less fortunate ones write—"My wife don't enjoy outing trips with me!"
—H. E. RANSIER, *Manlius, N. Y.*

The purpose of this note is to supplement my article published in the FERN JOURNAL last year (vol. 15, p. 124), and with special reference to the young plants of Hart's-tongue being raised at the Brooklyn Botanic Garden for widespread distribution and naturalization. A number of inquiries have come in as a result of the FERN JOURNAL note and another which appeared in several newspapers.

The young sporelings are developing well. Eventually a large number will be available. Reference to Dr. House's paper in this same number and to Miss Mabel Hunter's article in the FERN JOURNAL during 1924 (vol. 14, p. 102) and one in the *American Journal of Botany*, 9: 28–36, show that transplantation and naturalization of wild plants has succeeded a number of times. I do not know of any reference to any attempt to establish the Hart's-tongue by the use of greenhouse grown plants.

However, since these Botanic Garden sporelings have been raised from spores obtained from central New York sources, it is to be hoped that the progeny will be able to adapt themselves to outdoor conditions and to endure winter cold.

It will be important to give them, as nearly as possible, what have appeared always to be the best environmental conditions here in the United States. These requirements include limestone substratum, soft, loose, well-drained humus soil, broad-leaf shade trees, such as butternut and basswood, often associated with an herbaceous undergrowth of jewel-weed, herb Robert, *et al.* An east to north exposure with cliff protection at the back is a further concomitant in the Jamesville district. In general, the various localities seem such as to give protection against too extreme evaporation. Reference to plate 3, or to the article "Game laws for ferns and wild flowers" AM. FERN JOURN. 12: 33–45, 1922) will show plants in typical positions.

According to the present rate of development, the first distribution of plants can be made by June. Some of the plants will then have leaves two to three inches in length.

Application should be made to me at the Brooklyn Botanic Garden. The question as to the cost of distribution can be settled in connection with each shipment. It will include merely the expense of containers, packing, and postage.—R. C. BENEDICT, *Brooklyn Botanic Garden, Brooklyn, N. Y.*

Equisetum variegatum nelsoni a Good Species[1]

JOHN H. SCHAFFNER

A. A. Eaton described *Equisetum variegatum nelsoni* as a new variety in 1904 (Fern Bull. **12**: 41), naming among its most important characters, annual habit, rounded ridges with cross-bands of silex, and teeth with filiform deciduous points. He stated that it was "almost exactly between *Jesupi* and *laevigatum* with which it grows associated along a canal at South Chicago, Ill. *N. L. T. Nelson.*" He further says that "It is a good subspecies and were it not for the fact that the group is so variable would be entitled to specific rank." Farwell raised it to specific rank in 1916 under the name *Hippochaete nelsoni* (Mem. N. Y. Bot. Gard. **6**: 461–472). He regarded it as intermediate between *Hippochaete laevigata* (A. Br.) Farw. (*Equisetum kansanum* Schaffn.) and *Hippochaete hyemalis jesupi* (A. A. Eat.) Farw. (*Equisetum variegatum jesupi* A. A. Eat.). So far as the writer is aware no one else has treated it as a species in the meantime.

Having become acquainted with the plant through herbarium specimens, the writer was inclined to agree with Farwell as to its specific rank but until the past season no opportunity presented itself for studying it in the field. Having seen good material collected at Douglas Lake, Mich., by Prof. Frank T. McFarland of the University of Kentucky, it was determined to examine the plant in its native habitat. Accordingly, several days were spent in the early part of July at the Biological Station of the University of Mich., located on the shore of Douglas Lake, in Cheboygan County, about 13 miles

[1] Papers from the Department of Botany, The Ohio State University. **No. 168.**

S. W. of Cheboygan. Through the kindness of Drs. John H. Ehlers and George E. Nichols the writer found abundant material for study and concluded that it was well entitled to rank as a species in comparison with other species of Equisetum. It grew in abundance in a grassy moist swamp near the lake and on the sandy beach. It was much taller in the moist swamp than on the beach, but in a small patch of richer soil on the beach it was nearly as large as in the swamp. Eaton's description is quite accurate but it does not appear to have absolutely annual aerial stems. In some cases at least the bases appear to survive the winter, although the tops die down. No *Equisetum variegatum* was found in these localities.

The species may be characterized as follows:

Equisetum nelsoni (A. A. Eat.) comb. nov.

E. variegatum var. *nelsoni* A. A. Eat. Fern Bull. **12**: 41. 1904.

Hippochaete nelsoni (A. A. Eat.) Farw. Mem. N. Y. Bot. Gard. **6**: 472. 1916.

Aerial shoots annual but the bases sometimes surviving until the second season; stems 6–20 in. (1.5–5 dm.) long, inclined to be flexible, usually unbranched; central cavity small; ridges of the internodes 5–12, rounded, with cross bands of silex, not with a central groove nor biangulate, except rarely in one or more internodes of minute stems and then only in a slight degree; leaf sheaths mostly distinctly campanulate or ampliated, typically green with a narrow black limb, often becoming dark or black with age, 5–12-toothed, the teeth persistent but their bristle tips more or less deciduous; teeth with a black or brown center and a broad white or hyaline margin; teeth and the upper part of the sheath segments quadricarinate, with a distinct central groove above but the lower part of the segment rounded; cones small, distinctly apiculate.

This species can be readily distinguished from *E. variegatum* Schleich. as follows:

E. NELSONI—Ridges of the internodes rounded, with cross bands of silex; sheath segments grooved only at the upper end, the base rounded; aerial shoots annual or at most only the bases surviving the winter, inclined to be slender and flexible.

E. VARIEGATUM—Ridges biangulate, with a broad central groove and a double row of tubercles; sheath segments grooved through the base, the groove continuous with the groove of the internodal ridge; aerial shoots perennial, mostly rigidly erect.

Equisetum nelsoni, E. variegatum and *E. scirpoides* constitute a distinct and the most extreme section of the EQUISETA HIBERNA. Although *E. nelsoni* is practically annual and has thus advanced beyond the rest of the species in this respect nearly to the level of the EQUISETA AMBIGUA and the higher horsetails yet in other respects it must be regarded as the most primitive of the three. Its superficial resemblance in certain characters to *E. kansanum* is merely a case of parallelism and it can always be distinguished at a glance by its cones. Its characteristic quadricarinate teeth will readily distinguish it from small vegetative shoots of either, *E. kansanum* or *E. laevigatum*, both of which have bi- or tri-carinate sheath segments, or are often nearly smooth.

E. nelsoni may be regarded as derived from a more primitive ancestor side by side with *E. laevigatum* and *E. kansanum* and advancing along with the latter to the anual condition, but otherwise retaining its group characteristics. *E. varigatum* has advanced farther in reduction of the aerial shoot and central cavity and has developed the centrally grooved leaf segments and biangulate internodal ridges in somewhat the same way as *E. hiemale* has in comparison with *E. praealtum*.

E. scirpoides shows the most extreme reduction and specialization of the aerial shoot in harmony with boreal conditions. The solid stem and curly, hair-like habit must be regarded as characters of secondary origin. In the development of the grooved internodal ridge, it has advanced to the extreme condition so that there are two distinct ridges for each of the three teeth and sheath segments.

COLUMBUS, OHIO

Some Notes on the New Hybrid Aspleniums

E. W. GRAVES

In reading the account of the Appalachian Aspleniums by Dr. E. T. Wherry in No. 2 of Vol. 15 of the JOURNAL, I was very much interested in the hybrid *Asplenium trudelli*, for I have had in my herbarium for a number of years nine plants which I collected on sandstone cliffs near Long Island, Alabama, which agree with the description of that hybrid.

In November, 1917, while searching a cliff for *Asplenium pinnatifidum*, I came across quite a colony of what I thought was a peculiar form of *pinnatifidum*. The plants were growing on the northwest side of an almost inaccessible part of the cliff. I could not reach them from below, but by clinging to the rough sides I managed to climb down from above. I procured several bunches, one plant especially large, with fronds ten inches long and two and a half broad. In examining the cliff I found that only two Aspleniums besides this peculiar form inhabited it. I took the specimens home and after examining them decided they were not *pinnatifidum*, for I had found hundreds of plants of that fern and never before had I seen one like these. Some

of them looked more like *Asplenium montanum* than *A. pinnatifidum*.....I packed several plants and sent them to Dr. Maxon, asking what he thought of them. He replied that they appeared to be a variant form of *pinnatifidum*. I let the matter rest at that, but I was not satisfied to call them *pinnatifidum*. The plants I sent to Dr. Maxon I suppose were deposited in the National Herbarium, but Dr. Wherry makes no mention of them in listing localities where *A. trudelli* had previously been collected. I also sent a plant or two to the Society Herbarium, and have sent some to different members of the Society.

Since reading Dr. Wherry's description I have carefully studied my herbarium specimens and I feel that he is correct in calling this form a cross between *A. pinnatifidum* and *A. montanum*, as those two were the only ferns growing in the immediate vicinity. There were more plants of the hybrid than of the supposed parents growing at this place. Many were inaccessible and perhaps by this time, if weather conditions have been encouraging, may have developed into large plants. The illustration drawn by Mrs. Weatherby which accompanies this paper will show how some of my plants look.

Another fern described by Dr. Wherry in his paper was *Asplenium stotleri*, which he seemed to think was a cross between *A. pinnatifidum* and *A. platyneuron*. I found one or two plants which answer very nearly to his description. They were the first plants I sent to Dr. Maxon, which he finally decided were the hybrid *A. gravesii*. These first plants I found had more slender pinnae than others I collected later. Some of the smaller fronds on the same plant showed rounded or triangular pinnae below. As *A. trudelli* varies in this respect, I am inclined to believe that *A. gravesii* also varies. In his description of *A. stotleri* Dr. Wherry says that margins

of the pinnules are rounded instead of sharply toothed; that is often characteristic in *A. gravesii.*

Take a look at Dr. Wherry's illustrations on page 46, vol. 15 of the JOURNAL. Notice the marked difference between no. 4 and no. 5; yet there is just that much change in fronds of *A. trudelli* even on the same plant. No. 5 shows the sharp-edged pinnae of *A. montanum.* If you will look at no. 1 of my illustrations you will notice one frond in the middle which looks like no. 4 in Dr. Wherry's chart, while the larger fronds look like no. 5. Now notice nos. 8 and 12 of his chart; the dark stipe is nearly the same, the rounded edges and long pinnae of no. 12 resemble no. 10 somewhat. Look again at my chart. No. 3 has long drawn out pinnae; while not quite so narrow as Dr. Wherry's no. 12, yet no. 3 and no. 4 of my chart grew on the same plant, which was determined as *A. gravesii* by Dr. Maxon.

I cannot agree with Dr. Wherry in calling no. 12 a new hybrid until we get more definite proof, but I do agree with him in saying that *A. trudelli* is a hybrid between *Asplenium pinnatifidum* and *Asplenium montanum.*

I wish to thank Mrs. Weatherby for her kindness in preparing the accompanying illustration.

BENTONSPORT, IOWA

A Few More Fern Finds

LESTON A. WHEELER

In the October-December, 1924, and the July-September, 1925, number of the AMERICAN FERN JOURNAL the articles by W. R. McColl and Henry Mousley have quite aroused my interest as I, too, have always been attracted by the unusual in plant life. Whether we regard them

3
4
2
7

as mere freaks, or as reversions to past types, or yet as the progenitors of possible new forms, these variations are always interesting.

In spite of all my efforts I never saw a crested fern until the autumn of 1923 when a neighbor who was picking ferns for market gave me a number of fronds of the Christmas fern (*Polystichum acrostichoides*) which were beautifully crested. These finds seem to have broken the ice, for later in the same season I found, in the town of Castleton, a beautiful forked frond of the marginal shield fern (*Aspidium marginale*). In 1924, while showing some friends the view from a nearby elevation, I found, beside the road, three fronds of the pasture brake (*Dicksonia punctilobula*). One of these had three well developed points. During the past season (1925) I found others in North West Bethel, Maine. I have a colony of this fern which has peculiar irregular fronds which look as though eaten by insects. All around are great numbers of colonies bearing perfectly normal fronds.

By the way, I would like to ask our respected editors if crested and forked fronds are common to all species of ferns. Are there any immunes?

I have several sheets of the lace fern (*Aspidium spinulosum*, var. *intermedium*) with beautifully crisped and curled fronds.

Mr. McColl has put me all in the shade (where a fern lover is usually to be found) with his 250 fronds of the maidenhair spleenwort (*Asplenium Trichomanes*). My best find was a plant from roadside ledges in the town of Dummerston with over 70 fronds.

Extremes in size are always interesting. I have the common polypody (*Polypodium vulgare*) with fruiting fronds only 10 cm. high, and six entire plants of my sheet of *Trichomanes Petersii* from the herbarium of E.

W. Graves, Alabama, can be covered with a silver quarter, while plants of *Hymenophyllum tunbridgense* from Dr. Selim Birger are not much larger. On the other hand I have a plant of *Botrychium virginianum* 97½ cm. high by 35 cm. broad, as mounted, thus exceeding that of Mr. Mousley in one dimension and falling short in the other. My ostrich fern (*Onoclea Struthiopteris*) is 173 cm. in length, while my royal fern (*Osmunda regalis*) is 140 by 61 cm. These large specimens have taken from three to five sheets of herbarium paper each in order properly to display their beauty. The frond has to be cut and carefully mounted so that each piece may match as nearly as possible the other pieces when laid in order. The royal fern here mentioned was growing near the outlet of Grout Pond in the town of Stratton at an elevation of 2,225 feet and was one of many which were truly regal in their tropical beauty. One need not go to the tropics to find beautiful ferns.

My best *Ophioglossum vulgatum*, of which I have many, has two fronds 25 cm. in length.

The specimen *gigantea* of my collection is a fern ally, *Equisetum fluviatile*, collected in a muddy creek near West River. It is more properly a group and consists of twelve or more stems arising from a stout rhizome 127 cm. long. The tallest of these stems is 118½ cm., while the average is 109½ cm. It took sixteen sheets of paper to mount the group. Drying and mounting the many pieces without mixing required quite an amount of care, as can well be imagined.

I cannot match Mr. Mousley, with his four fruiting panicles of *Botrychium virginianum*, as I have only three, the tallest of which is 90 cm. above the sterile frond. Two and three fruiting panicles seem to be fairly common for the genus. My smallest plant of the species is 91½ cm., thus exceeding that of Mr. Mousley by 1½

cm. My smallest for the group is 2¼ cm., of *Botrychium lanceolatum* var. *angustisegmentum*. I have fine specimens of several species of the genus with their winter buds or next year's fronds snugly concealed in the bases of the present year's stems.

I have large as well as otherwise interesting specimens in other groups, but as this is a "Fern Journal" they need not be discussed here.

Some plants which are more or less slender can be folded or coiled on a single sheet of paper without detriment to their beauty or usefulness; but others, including many ferns, are broad as well as tall and must be divided if one would show them properly. Of course, in many cases the collector can secure small plants, but of many ferns, such as those mentioned above and the male fern (*Aspidium Filix-mas*), Goldie's fern (*Aspidium Goldianum*), and *A. spinulosum* var. *dilatatum*, a small specimen does not give a true idea of the plant as it is to be found in its native habitat. In dividing a frond one sometimes needs must split as well cut and mount the pieces as rights and lefts.

TOWNSHEND, VERMONT

Recent Fern Literature

Prof. F. L. Pickett and Miss Mildred Manuel have described in detail the growth of the prothallium and the production—so far as observed, always apogamous—of the young sporophyte in *Pellaea glabella*.[1] In connection with this study they have also continued Prof. Pickett's experiments on the power of the prothallia of xerophytic ferns to withstand drought, using as subjects the two purple cliff brakes, *P. glabella* and *P. atropurpurea*.

[1] Pickett, F. L. and Manuel, Mildred. Development of prothallium and apogamous embryo in Pellaea glabella Mettenius. Bull. Torr. Bot. Club 52: 507–514, figs. 1–32. Dec., 1925.

Colonies of prothallia of both species, left in the greenhouse 124 days without water, showed nearly all the plants living. They were moistened and then left 142 days more in a dry cupboard, after which more than half the plants were still alive. Other cultures, one of which had been without water nine months and twenty days, showed fully 75 per cent. of survival. Even more remarkable was the vitality shown by still other cultures which after 138 days without water in the greenhouse, were placed in receptacles kept absolutely dry by chemical means for eighteen and a half months and then showed a few plants alive and capable of growth.

The investigators' final paragraph, dealing with the seasonal history of these ferns, is worth quoting entire. "Fertile fronds appear in March or April and show mature spores by the first of July. When the atmosphere is dry the sporangia and spores are closely enclosed by the inrolling of the marginal false indusium. In moist periods the spores are freed, and come in contact with the nearby soil or cliff face. If the moisture persists for several days, the spores germinate. Alternate periods of abundant moisture and of drought, such as are common throughout the ranges of these ferns through the summer, merely serve to arrest the growth of the prothallia. Free from the need of water as an aid to bringing about fertilization, when they have reached a proper stage of maturity, the prothallia produce embryo sporophytes apogamously, and these in three or four years produce spores."[2]

Prince Roland Bonaparte's daughter and heir, H. R. H. Princess George of Greece, has generously presented to the Society copies of the last three fascicles, nos. 14,

[2] An ecological study of certain ferns: Pellaea atropurpurea (L.) Link and Pellaea glabella Mett. Bull. Torr. Bot. Club 53: 1–5, figs. 1–4. Jan., 1926.

15, and 16, of her father's "Notes Ptéridologiques." They follow the plan adhered to throughout the series (see this JOURNAL 8: 22, 1918). Fascicle 14 gives determinations of miscellaneous collections of ferns from nearly all parts of the world. Number 15 deals with African ferns in the United States National Herbarium, particularly those collected by the Roosevelt Expedition in 1909–10. No. 16, which was published after the author's death by Dr. Christensen, who has added a supplement, records ferns collected in Madagascar by M. Perrier de la Bathie, who spent more than 25 years in explorations in that island.[3]

A printed slip sent with the "Notes" states that Prince Bonaparte's great herbarium was bequeathed to the Museum of Natural History at Paris.

The Society's copies of the "Notes" are in the Secretary's hands and may be borrowed by any member interested.

Somewhat more than a year ago (see this JOURNAL **14**: 91, 1924), Prof. E. W. Berry stated that a fossil plant recently described by Prof. Cockerell as *Ophioglossum hastatiforme* was not an *Ophioglossum* at all, but a *Danaea* referable to *D. coloradensis* Knowlton. Prof. Cockerell now replies that, though his plant is truly not an *Ophioglossum*, it is still less a *Danaea*. He now thinks it is an alga of an extinct family! Those of us who are sometimes driven almost to despair in attempting to classify certain groups of contemporaneous ferns may again take some comfort from the greater difficulties of the paleontologist. At least, we can tell whether our plants are ferns or not.[4]

---

[3] Bonaparte, Prince Roland. Notes Ptéridologiques. Fascicule XIV, pp. 492, Paris, 1923. XV, pp. 58, 1924. XVI, pp. 198, pls. 8, 2 maps, 1925.

[4] Cockerell, T. D. A. The supposed fossil Ophioglossum. Torreya **26**: 10–11, Jan.–Feb., 1926.

Prof. Berry has described as new a fossil *Selaginella* from Eocene deposits in Wyoming and Tennessee, giving it the name *S. preauriculata*, in allusion to its resemblance to the existing *S. auriculata*.[5]

FERN COLLECTING IN MEXICO.—In 1924 my vacation was spent and my plant collecting done in southern Mexico. As for ferns, the trip was very interesting, resulting in the finding of many different species growing in many peculiar places. A short description of three of the locations where ferns were plentiful may be of interest to readers of this JOURNAL.

The Pedregal is a lava flow from Mt. Ajusco about twelve miles to the south, is two or three miles wide at the end of the flow, and fills the entire valley to a depth of five to thirty feet. The lava in coming down the mountain side and on the more level valley floor must have encountered pools of water because in many places there are blow holes eight to fifteen feet across and twenty feet deep. On the edges of the lava flow, on the walls, and in cracks of the rocks are the homes of the ferns.

Those most plentiful, and about equal in numbers are: *Pellaea arsenei* Christ, *P. cordata* J. Sm., *Cheilanthes myriophylla* Desv., *Polypodium thyssanolepis* A. Br., *P. araneosum* M. & G., *Notholaena sinuata* Kaulf., and *N. bonariensis* C. Chr. Others less frequent, but still present in thousands to the acre, are: *Cheilanthes kaulfussii* Kunze, *Adiantum poiretii* Wikstr., *Asplenium praemorsum* Sw., *Bommeria pedata* Fourn., and perhaps fifteen other species.

Under the lava at San Angel in an excavation is to be seen, in its original position, a human skeleton together with pottery, etc., pronounced by specialists to date from

[5] Berry, E. W. A new Salvinia from the eocene. Torreya 25: 116–118, figs. 1–4, 1925.

the Neolithic Age, a division of the Stone Age 4,000, 5,000, or some say 10,000 years B. C. The electric car line from Mexico City to San Angel or Tlalpam, 12 miles, is the best way to go out.

Amecameca, at the foot of the volcano Popocatepetl, from which now only water and sulphurous gases are thrown out (the last fire and hot lava flow was over 100 years ago), is also a good location for fern collecting. It is forty miles from Mexico City and has a couple of small hotels.

One mile up the small river, on a rock wall 200 feet long and 10 feet high, I collected 15 species. Those most common were: *Polypodium polylepis* Roem., *Cheilanthes pyramidalis* Fée, *Woodsia mollis* Sm., *Pellaea ternifolia* Link, *Woodsia mexicana* Fée, and the very beautiful *Notholaena nivea* Desv., with fronds four inches long, the under side snow white, as the name indicates. Farther up the mountain are to be found: *Polypodium subpetiolatum* Hook., *Adiantum andicola* Liebm., *Asplenium commutatum* Mett., *A. monanthes* L., *A. melanorachis* C. Chr., about ten other species, and last that well-known *Cystopteris fragilis* Bernh.

Orizaba in the State of Vera Cruz was another good fern center visited. The altitude here is 4,000 feet, while the preceding stations were 7,000 to 9,000 feet. The climate in Orizaba in July is like a New England June. In the same month the higher altitudes are as the middle of May in New York, if not cooler.

With the temperature the species change, and at Orizaba we have: *Polypodium brasiliense* Poir., *P. angustifolium* Sw., *P. aureum* L., *P. furfuraceum* S. & C., *Phanerophlebia remotispora* Fourn., *Asplenium pumilum* Sw., *Pellaea rigida* Hook., *P. flexuosa* Link, *Lycopodium reflexum* Lam., *Adiantum amplum* Presl, *A. concinnum* H. & B., *Dryopteris panamensis* C. Chr., a *Nephrolepis*, a *Blechnum*, two or three *Cheilanthes*, and about ten others, including a *Selaginella*.

At Cordoba, twenty miles on the way to Vera Cruz, tree ferns begin to make their appearance, and as one goes on to the south into the true Tropics, the workings of nature are going on in the semi-Jurassic Geological Age, so to speak; that is, relics of that distant age in the animal and plant life are here reproducing themselves. This I will leave for a later article.

As already noted in the JOURNAL, the writer will make a collecting trip to the stations mentioned, leaving in July, and Fern Society members wishing to make the trip will be welcome.—GEORGE L. FISHER, *Houston, Texas.*

NEW PLANT CONSERVATION LAWS—Last year the State of Massachusetts passed a law covering the protection of the Trailing Arbutus in that state. In New York State the present session of the Legislature has enacted an extension of the law passed last year, by the terms of which it was made illegal to pick Trailing Arbutus on public property, either in State Park Reservations or on land under the control of towns and villages. The new law calls for the addition of three more plants which shall be similarly protected; namely Mountain Laurel, Flowering Dogwood, and the Pink Lady's Slipper, or Indian Moccasin Flower.

We may be thankful for the favorable consideration of this 1926 proposal, not only for the measure of protection which will be afforded these plants, but even more because it will represent more extended recognition of the State's interest in the protection of these objects of natural beauty. It will further be valuable as a basis for the publicity and diffusion of interest in the general plant conservation movement, supplementing and seconding in this way the various educational measures which are being carried out through schools and the newspapers.—R. C. B.

Mr. Wheeler asks if forked and crested forms are common to all species of ferns. The answer appears to be "yes." Such phenomena are, indeed, always rare in the wild and there are therefore many species in which they have not actually been recorded. But on the other hand there are so many, of both temperate and tropical climes and of very different normal forms of frond, in which cresting and similar variations are known that it seems safe to conclude they would turn up in any or all species if only a large enough number of individuals (it might take many thousands) could be examined. In other words, there is in all or nearly all ferns a certain inherent tendency toward this sort of variation which manifests itself now and then in response to stimuli the nature of which is not apparent.

In the Fern Bulletin **12**: 114–118, 1904, August Hahne gives a list of forked and crested forms filling three pages; doubtless many more items could be added to it.—C. A. W.

American Fern Society

As remarked by Dr. House, Mr. Ransier left an important item out of the story of his distribution of hart's-tongues. A letter of his to the Treasurer supplies the omission:

"Enclosed you will find my check for $27.64, the amount I received for Hart's Tongue ferns, above actual expenses in getting them packed and mailed.

"I did not know, when it was suggested that I attend to them, whether I could do the work myself or not, nor just what circumstances I would be up against, so I charged enough to make it practical, with the understanding that the profits would go into the Treasury, for the purpose of furnishing cuts when needed."

Later advices from Mr. Ransier bring the amount to about $30; he has the heartiest thanks of the editors and, we are sure, of every reader of the JOURNAL.

John Hall Sage, a member of the Society since 1916, died in a hospital in Boston, Aug. 16, 1925. He was born at Portland, Conn., April 20, 1847, of old colonial stock, his ancestors on both sides having been among the earliest English settlers in the lower Connecticut valley. He received a high school education. His business career began with a clerkship in the office of the Aetna Life Insurance Co. in Hartford. In 1873 he returned to Portland, to become teller of the local national bank and treasurer of an affiliated savings bank. In these two institutions the rest of his business life was passed.

He married Agnes Farwell Kellogg, Sept. 16, 1880.

He twice visited Europe; he went with Merriam's expedition for the biological survey of Mt. Shasta; he spent many vacations in the Maine woods (where his last illness overtook him) and parts of others on the Rhode Island coast. His house at Portland, set in ample tree-studded grounds a little back from the main village street, attracted birds and naturalists alike—and both found abounding hospitality.

He was a man of many interests. Local history, the work of the church (he was a devout Episcopalian), and all branches of natural history claimed his attention. His observations on plants were often noteworthy. But his principal interest was in ornithology. Realizing that an amateur, if he is really to accomplish anything, must not attempt to cover too wide a field, he deliberately restricted himself to the study of the birds of Connecticut. He collected and observed assiduously, to the end of his life spending many days yearly in the field. His last letter to the writer tells of an early spring visit to a favorite spot and records the condition of a colony of climbing fern there. The whole country-side appeared

to have become his assistants; a visit to him was likely to be punctuated by the appearance of a farmer's boy bringing a bird or animal supposed to be rare. He soon became a recognized authority in his chosen field. He was one of the early members of the American Ornithologists' Union, its secretary from 1889 to 1918 and its president from 1918 to 1921. He was the author of numerous ornithological papers and co-author of the bulletin of the Connecticut Geological and Natural History Survey on the birds of the state.

Rugged of feature—most people would have called him homely, but few can have failed to be attracted by him—modest, kindly, enthusiastic in his own work, and full of helpful interest in that of others, he remains a happy memory to those who knew him.

Mr. Sage was the owner of one of the comparatively few complete sets of the *Fern Bulletin*. This, with his other scientific books and his collections of birds and plants, was bequeathed to the Wadsworth Atheneum, of Hartford.

Rev. George H. Tilton, a member of the Fern Society since 1922, and author of *The Fern Lover's Companion*, an illustrated manual of the ferns of northeastern North America, died at his home in Melrose, Mass., on January 8th.

Mr. Tilton was born in Nashua, N. H., January 31, 1845. His ancestors settled in New Hampshire in the 17th century near the town of Tilton to which they later gave the name. He was a graduate of Williston Seminary, Amherst College, and Andover Theological Seminary. He also took a two years course in medicine in New York with the intention of becoming a missionary. He held pastorates in Congregationalist churches in Attleboro, Rehoboth, and Woburn, Mass., and in Wolfboro and Lancaster, N. H. In Rehoboth he founded the Rehoboth Antiquarian Society and wrote a history of the

town. He wrote a history of the church in Lancaster and a book on the native trees and other plants of that region. In 1901 he published a Memorial of Marshall Hanshaw, D.D., LL.D., of Amherst College.

His interest in botany and especially in ferns began during his college days at Amherst and continued through his life. His discovery of *Botrychium Lunaria* at Willoughby Lake, Vt., was the first record for that species in New England. His fern book was published in 1922 and at the time of his death he was preparing a companion book on mosses.

Report of the President for 1925

The activities of the Fern Society for the year just closed were of the usual sort, and, having been for the most part duly reported in the JOURNAL, do not require very much further comment. The JOURNAL, now beginning its 16th year, is in itself the best indication of our success in an important field of nature study. To its pages there are contributed by the members of the Society numerous short items of interest, and many longer articles ranging from narratives of botanical exploration at home and abroad to such technical matters as the description of new species and the discussion of evolutionary descent; there is something for nearly every one, a balance which it is not always easy to maintain, and for which the Society rests under deep obligation to its Board of Editors. On the whole, it is the short, live notes, summarizing personal observations as to habit, structure, distribution, and distinctive traits, that carry the greatest interest to the greatest number; and so it is urged once more that the members, scattered far and wide, constitute themselves "committees of one" to pour into the JOURNAL a small flood of pertinent short articles.

In this way, and by a free exchange of specimens (long a special feature of our activities), will our interest and influence continue to increase. We welcome especially the new members from distant Australia.

In one other respect also we have been notably successful: There are probably very few societies, with so small and widely distributed a membership, whose financial condition is so sound. This is due very largely to the foresight and wise counsel of our former president, C. H. Bissell, whose death occurred in April last. We have also to note with deep regret the death of John H. Sage, long a member of the Society, and of Miss M. A. Marshall, our honored Vice President for several years. Miss Marshall's herbarium of several hundred mounted ferns was bequeathed by her to the Society and has been added to the Herbarium.

For the year 1926, many good things are planned, including more pages and more illustrations for the JOURNAL, a summer field meeting in Vermont, a new membership list, made necessary by our recent growth, and a winter meeting during Convocation Week at Philadelphia. Without the steady support of the members, for which the officers of the Society are grateful, these things would not be possible.

Respectfully,

WILLIAM R. MAXON, *President*

Report of the Secretary for the Year 1925

The year 1925 has been marked by a distinct increase in membership. Thirty-one persons have been enrolled and one other restored to membership. Against this we have to set the loss by death of six members, an unusual number in a year, and the resignations of twelve others. Mr. C. L. Gruber has become a life member. The pres-

ent records show 315 active members of the Society. This is a net gain over last year of thirteen.

The list of those who have died included Miss Marshall, for some time our Vice President, and Mr. Bissell, who was a well known fern enthusiast and expert; Dr. Brainerd, of Middlebury College, has also been taken from us by death this year.

Perhaps the most outstanding incentive to increase membership has been Dr. Maxon's delightful article in the *National Geographic Magazine,* for May, 1925, from which we can definitely say certain new members have come. Those who have not seen this article should try to secure copies. It is beautifully illustrated and most interesting.

The Secretary wishes again to remind members that the Society has a nearly complete set of the *Fern Bulletin* and a complete one of the JOURNAL (and certain other literature besides) which may be borrowed by members on application to him and payment of transportation charges.

C. S. LEWIS, *Secretary*

Report of the Treasurer for 1925

RECEIVED

Cash on hand Jan. 1			$ 463.09
Membership dues:	1923	$ 4.50	
	1924	42.00	
	1925	386.15	
	1926	28.50	
Total		$461.15	
Subscriptions to Journal		62.09	
Illustrating Fund, gifts, etc.		51.59	
Emergency Fund, from Back Nos.		47.94	
Reprints and postage		12.68	
For bad check redeemed		1.25	
Interest		20.00	
Check collection and Misc.		3.58	
Total receipts			660.28
			$1,123.37

PAID OUT

Treasurer's expenses			15.00
Secretary's expenses			18.65
Reprints and postage			14.24
Bad check			1.25
Exchange			.29
Journal Expense—			
Illustrating	$42.17		
Illustrating Fund	22.95		
Total Illustrating		65.12	
Printing and postage		310.92	
Editor's expense		19.60	
Insurance on Back Nos.		10.00	
TOTAL JOURNAL EXPENSE			405.64
TOTAL PAID OUT			455.07
BALANCE ON HAND AS OF DEC. 31			$ 668.30

This balance is made up as follows:

EMERGENCY FUND		
Brought Forward Jan. 1	$ 87.28	
Received Sale of Back Nos.	47.94	
Balance on Hand		$135.12
ILLUSTRATING FUND		
Brought Forward Jan. 1	1.01	
Gifts Received	23.95	
From H. E. Ransier from sale of Hart's Tongue	27.64	
TOTAL RECEIVED	$ 52.60	
Paid for Illustrations	22.95	
Balance on hand		29.65
Special Order holding for Catalog of Herbarium		25.00
GENERAL FUND FROM DUES, SUBSCRIPTIONS, ETC.		478.53
		$ 668.30

SPECIAL PERMANENT FUND, established by LIFE MEMBERSHIPS, transfers from the Emergency Fund which comes from the sale of back numbers of the JOURNAL, interest, etc.

On hand Jan. 1		$ 572.77
One Life Membership received	25.00	
Interest received	26.82	
Total received		51.82
Balance on hand		$ 624.59

There are no unpaid bills for 1925 so far as the Treasurer knows.

While we are prosperous.is the time to lay aside our funds to carry us through any unexpected but possible slump in our prosperity. I recommend that we again transfer $100 from the Emergency Fund to the Permanent Fund.

I am very grateful for the promptness with which the great majority of our members pay their dues. This is a great help to the Treasurer and I thank the members for their assistance in this matter.

Respectfully submitted,

JAY G. UNDERWOOD, *Treasurer*

Report of the Editors for 1925

We are happy to report a satisfactory year for the JOURNAL. For various reasons, no. 1 was greatly delayed; since then, we have been able to keep at least within sight of our schedule, in spite of a temporary scarcity of copy late in the year. We have again been blessed with an extra appropriation of $30 by the Council; with its aid, with generous gifts from Prof. Schaffner, Mr. Mousley, and Mr. Leonard and the loan of a plate by the Smithsonian Institution, we have been able to publish twelve illustrations—a number unprecedented since the war—and also six extra pages of reading matter. Miss Corne's series has continued through the year; Dr. Maxon's, we hope, will go on forever, or at least till proper disposition has been made of all American ferns. Besides these continuing features, copy has been of good quality and variety and has furnished, we believe, interesting numbers. For all of which we offer our hearty thanks to our contributors. And we venture to remind them that, though we start the year with about enough copy for one number, we shall presently need more, and that the sooner we get it the better.

It rarely happens that one is wholly content with his lot. But thanks to the good financial condition of the Society and to the liberality of the Council, we are nearer than ever before to the condition which we have long desired—that of having funds enough to run, when

copy is plenty, such necessary matter as Society reports and indexes on extra pages and avoid the delays in the publication of desirable articles which strict limitation in the number of pages has not infrequently occasioned. A comparatively few more members would bring us all the way.

R. C. BENEDICT,
E. J. WINSLOW,
C. A. WEATHERBY,
Editors

New members:

Barnes, Mrs. Albert C., The Barnes Foundation, Merion, Penna.
Brown, Mrs. Ernest C., Unity Lodge, Copake, N. Y.
Pratt, Mrs. Charles H., 86 Aberfoyle Road, New Rochelle, N. Y.
Ryder, Mrs. Mary D., 205 Almaden Ave., San Jose, Cal.
Talbot, Harry L., Waverley, Mass.
Upham, Alan W., East Woodstock, Conn.
Westley, Edwin, 1395 Morton Ave., Pasadena, Cal.

Changes of address and corrections.

Benfield, Rev. W. A., Sink Grove, W. Va., not Link Grove.
Braun, Miss E. Lucy, not Miss Lucy E.
Geske, E. J., P. O. Box 3733, West Palm Beach, Fla.
Munz, Philip A., 1165 Indian Hill Blvd., Claremont, Cal.
White, Kelton E., 411 N. Newstead Ave., St. Louis, Mo.

Through the kindness of Prof. Monroe, the members of the Society have an opportunity to attend a field meeting in an especially interesting region. With generous hospitality, he has invited us, together with the Torrey

Botanical Club and the New York Section of the Green Mountain Club, to be his guests at his farm on the eastern slopes of Couching Lion (probably better, if less poetically, known as Camel's Hump), Vermont, July 3rd to 5th, and to extend our meeting through the following week if the members present so desire. Vermont has been dubbed "the fern lover's paradise"; the famous fern localities on Mt. Mansfield and in Smugglers' Notch are less than twenty miles from the farm; altogether the prospect is unusually attractive.

The nearest railroad station is North Duxbury on the Central Vermont between Montpelier and Burlington. For further details, write to Prof. Will S. Monroe, Couching Lion Farm, Waterbury, Vermont, or Mr. J. G. Underwood, Hartland, Vermont.

A set of lantern slides showing many species of ferns growing in the field, prepared by our former member the late Rett E. Olmstead is offered for sale by Mrs. Margaret T. Olmstead, Excelsior, Minn., who will gladly supply complete information.

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Vol. 16 July-September, 1926 No. 3

American Fern Journal

A QUARTERLY DEVOTED TO FERNS

Published by the

AMERICAN FERN SOCIETY

EDITORS

R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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A regular loan department is maintained in connection with the Society herbarium. Members may borrow specimens from it at any time, the borrower paying all postal or express charges. The pages of the Journal are also open to members who wish to arrange exchanges; a membership list is published to further assist those interested in obtaining specimens from different localities.

List of Members of the American Fern Society

Revised to July 1, 1926

SUPPLEMENT TO
THE AMERICAN FERN JOURNAL
VOL. 16, NO. 3

List of Members of the American Fern Society

SUPPLEMENT TO AMERICAN FERN JOURNAL, JULY, 1926.

(*Charter Members; †Life Members; ‡Honorary Members)

Aiken, Walter H.; 1520 Aster Place, Cincinnati, O..... 1911
Allen, Dr. Fred H.; 16 Fairfield Ave., Holyoke, Mass..... 1921
Allen, Henry V. D.; Care of Canadian Dept., General Electric Co., Schenectady, N. Y. 1904
Allen, Walter S.; 224 State St., Flushing, N. Y..... 1917
Ames, Oakes; Ames Botanical Laboratory, North Easton, Mass..... 1903
Amidon, Dr. Royal Wells; Chaumont, Jefferson Co., N. Y..... 1911
Anderson, Miss Flora Charlotte; 327 South Henderson St., Bloomington, Ind..... 1917
Armstrong, Mrs. C. R.; Trudeau, N. Y..... 1906
Arnold, William T.; 21 Park Road, Wyomissing, Pa..... 1919
Atwood, Dr. Charles; 11 Church St., Moravia, N. Y..... 1912
Badè, Dr. William Frederic; 2616 College Ave., Berkeley, Cal..... 1901
Bailey, Dr. Liberty Hyde; Ithaca, N. Y..... 1921
Bailey, S. Waldo; 62 Holmes Road, Pittsfield, Mass..... 1921
Barnes, E. H.; Taxation Department, G. P. O. Bldg., Perth, West Australia 1926
Barnes, Franklin Augustus; P. O. Box 44, Bellona, Yates Co., N. Y. 1914
Barnhart, Dr. John Hendley; N. Y. Botanical Garden, New York.... 1911
Barrett, Chas.; "Maralena," Maysbury Ave., Elsterwick, Australia. 1926
Barrie, George N.; Roughwood, Chestnut Hill, Mass..... 1925
Bartsch, Dr. Paul; Smithsonian Institution, Washington, D. C..... 1911
Bates, Miss Ethel; Box 239, South Berwick, Maine..... 1917
Baxter, M. S.; 46 Bly St., Rochester, N. Y..... 1912
Bean, Ralph C.; 48 Emerson St., Wakefield, Mass..... 1920
Beattie, Mrs. Robert H.; 216 Overlook Road, Ithaca, N. Y..... 1923
Benedict, J. E., Jr.; 945 Pennsylvania Ave., Washington, D. C..... 1923
Benedict, Dr. Ralph Curtiss; 322 East 19th St., Brooklyn, N. Y..... 1905
Benfield, Rev. W. A.; Sink Grove, West Virginia..... 1924
Bill, Mrs. G. E.; 819 Third St., Harrisburg, Pa..... 1922
Birger, Dr. Selim; Grefturegatan 3, Stockholm, Sweden..... 1922
Bond, Miss Nancy K.; 201 East Seventh St., Superior, Wis..... 1924
Boughton, Fred S.; Pittsford, N. Y..... 1917
Braun, Miss E. Lucy, 2702 May St., Cincinnati, Ohio..... 1920
Bray, Dr. William L.; 1005 Harrison St., Syracuse, N. Y..... 1916
Breckenridge, Prof. Lester Paige; North Ferrisburg, Vt..... 1915
Breckenridge, Mrs. Lester Paige; North Ferrisburg, Vt..... 1915
Bristol, Miss B. Muriel; 17 Clarendon Road, Egbaston, Birmingham, England 1910
Bristol, Cecil T.; 17 Clarendon Road, Egbaston, Birmingham, England 1910
Britton, Mrs. Elizabeth Gertrude; 2965 Decatur Ave., New York.... 1911
Britton, Dr. Nathaniel Lord; N. Y. Botanical Garden, New York.... 1911
Brooks, Maurice G.; French Creek, West Virginia..... 1926
Brooks, Mrs. William F.; 48 High St., New Britain, Conn..... 1908
Brown, Miss Bertha M.; 10 Greenman Ave., Westerly, R. I..... 1921

Brown, Miss Elizabeth Gilman; 260 Genesee St., Utica, N. Y..... 1904
Brown, Mrs. Ernest C.; Unity Lodge, Copake, Columbia Co., N. Y. 1926
Brown, Herbert H.; 158 Glebeholm Blvd., Toronto, Canada..... 1926
Burgin, Herman, M. D.; 204 W. Rittenhouse St., Germantown, Pa..... 1915
Burlingham, Charles L.; 2418 Harrison St., Evanston, Ill. 1925
Burnham, Stewart Henry; Dept. Botany, College of Agriculture, Ithaca, N. Y..... 1897
Burrage, Albert C.; 85 Ames Building, Boston, Mass..... 1921
Bush, Benjamin Franklin; Courtney, Mo..... 1909
Butters, Prof. Frederic K.; University of Minnesota, Minneapolis, Minn. 1917
Campbell, Dr. Douglas Houghton; Leland Stanford Junior University, Palo Alto, Calif. 1915
†Capp, Seth Bunker; P. O. Box 2054, Philadelphia, Pa..... 1915
Carhart, Macy; Keyport, N. J..... 1915
Cheever, Dr. Austin Walter; 16 Elmore St., Newton Center, Mass..... 1911
Cheney, Prof. Ralph H.; New York University, Washington Sq., New York City..... 1925
Child, Mrs. H. W.; Hotel Bristol, Boston, Mass..... 1915
Child, W. A.; 389 Hess St., South Hamilton, Ontario..... 1917
Chisholm, Mrs. Maud L.; Proctor, Vt. 1923
Choate, Miss Alice D.; 3739 Windsor Place, St. Louis, Mo..... 1898
‡Christensen, Dr. Carl; Botanical Museum, Copenhagen, Denmark. 1915
Clark, Hugh Savage; Lancaster, Mass..... 1925
Clarke, Miss Elizabeth F.; 54 Forrester St., Newburyport, Mass..... 1921
Clarkson, E. H.; 41 Tyng St., Newburyport, Mass..... 1917
*Clute, Prof. Willard Nelson; Joliet, Ill..... 1893
Connolly, Mrs. T. F.; Elm Way, off High St., Westboro, Mass..... 1921
Corne, Miss F. E.; Suite 407 Craigie Hall, University Road, Cambridge, Mass..... 1910
Cornman, Mrs. L. R.; 2852 Adams Ave., San Diego, Cal..... 1917
Cowan, Alexander; Valleyfield, Penicuik, Midlothian, Scotland..... 1914
Dacy, Miss Alice Evelyn; 98 Hemenway St., Boston, Mass..... 1898
Dane, Mrs. Ernest B.; Roughwood, Chestnut Hill, Mass..... 1925
Darling, Miss Nancy; Sky Farm, R. D. No. 2, Woodstock, Vt..... 1909
Davenport, Mrs. Elizabeth Braxton; 45 Green St., Brattleboro, Vt. 1901
Deam, Charles Clemon; R. D. No. 6, Bluffton, Ind. 1905
Deane, Walter; 29 Brewster St., Cambridge, Mass..... 1911
Delafield, Mrs. John R.; 17 East 79th St., New York..... 1923
Demetrio, Rev. C. H.; Emma, Saline Co., Mo..... 1900
Dobbie, H. B.; 84 Market Road, Epsom, Auckland, New Zealand.... 1926
Dowell, Dr. Philip; Port Richmond, N. Y..... 1906
Dunton, Miss Nellie Frances; 14 Green St., Bath, Maine..... 1914
Durand, Herbert; Crow's Nest Wood, Bronxville, Westchester Co., N. Y..... 1924
Eames, Mrs. Edward A.; 155 Bryant St., Buffalo, N. Y..... 1918
Eaton, Frederick W.; Concord, Mass..... 1921
Eggleston, Willard Webster; U. S. Dept. of Agriculture, Washington, D. C..... 1911
Emmons, Edwin Thayles; Geneva, N. Y..... 1915
†Farwell, Oliver Atkins; 271 Smith Ave., Detroit, Mich..... 1913
Fazro, Mrs. Ernest; West Grove, Pa..... 1924
Fellows, Dr. Dana W.; 150 Park Ave., Port Richmond, N. Y..... 1900
Ferguson, William C.; 37 Atlantic Ave., Hempstead, N. Y..... 1920

Finegan, Mrs. Thomas E. (Grace B.); 613 North Front St., Harrisburg, Pa..... 1925
Fisher, George L.; 713 Leland Ave., Houston, Texas..... 1923
Fitzpatrick, Prof. T. J.; Bethany, Neb..... 1911
Flett, J. B.; 7563 19th Ave., S. W., Seattle, Wash..... 1899
Flint, Mrs. Elizabeth; Penryn, Placer Co., Cal..... 1925
Floyd, Fred Gillan; Hingham, Mass..... 1897
Foote, Mrs. E. M. (Caroline C.); 119 East 40th St., New York City 1925
Forbes, Fayette Frederick; Brookline, Mass..... 1911
Gardner, Mrs. Edwin P.; 140 Gibson St., Canandaigua, N. Y..... 1919
Gaudette, Mrs. Mary E.; Park Museum, Providence, R. I..... 1921
Gaylor, Mrs. Ilsien Nathalie; Hotel Gralyn, 20 Charlesgate West, Boston, Mass..... 1924
Geske, E. J.; P. O. Box 3733, West Palm Beach, Florida..... 1924
Gilmore, Mrs. Elizabeth; 1481 Mahoning Ave., Youngstown, Ohio.... 1923
Golding, Mrs. Ada; Mill River, Mass..... 1925
Goodale, Prof. Alfred S.; Dept. Botany, Amherst College, Amherst, Mass. 1921
Graves, Edward W.; Bentonsport, Iowa 1917
Gray, Rev. Frederick W.; Cass, W. Va..... 1923
Greene, F. C.; 1434 S. Cincinnati Ave., Tulsa, Okla..... 1913
Grout, Dr. Abel Joel; New Dorp, Richmond Borough, New York.... 1910
Grubb, Prof. Percy Lamar; 417 Briggs St., Harrisburg, Pa..... 1905
†Gruber, C. L.; Kutztown, Pa..... 1907
Hagerman, Samuel J., 1024 39th Ave., Oakland, Cal..... 1921
Hall, Mrs. Carlotta C.; 1633 La Loma Ave., Berkeley, Cal..... 1913
Halsey, Miss Alice; Garrison-on-Hudson, N. Y..... 1923
Halsey, Harold V. W.; 957 Boulevard, Astoria, Long Island, N. Y. 1921
Harper, Prof. Robert Almer; Columbia University, New York..... 1913
Harris, Sidney; R. D. No. 1, Vineyard Haven, Mass..... 1921
Hartline, Mrs. D. S.; State Normal School, Bloomsburg, Pa..... 1910
Hazen, Edwin Humphrey; 373 Crown St., New Haven, Conn..... 1923
Hazen, Dr. Tracy Elliot; Columbia University, New York..... 1910
Heermance, Miss Laura W.; 354 Edward St., New Haven, Conn..... 1923
Hensley, J. D.; 240 Forsythe St., Beaumont, Texas..... 1925
Holtzoff, Mrs. Mary; 145 West 123rd St., New York..... 1917
Hopkins, Prof. Lewis S.; Culver-Stockton College, Canton, Mo..... 1905
Horr, Mrs. Ella L.; 15 McKinley Road, Worcester, Mass..... 1911
House, Dr. Homer Dolliver; Education Building, Albany, N. Y..... 1918
Howe, Dr. Marshall Avery; N. Y. Botanical Garden, New York..... 1911
Huber, F. F.; Farmers' Nat'l Bank, Pennsburg, Pa..... 1926
Humphrey, George Scranton; 27 Pine St., New York City..... 1911
Humphrey, Miss Lillian; 311 South 8th Ave., Ironton, Ohio..... 1920
Hunnewell, Francis Welles, 2nd; 5 University Hall, Cambridge, Mass. 1915
Hunter, Dr. Mabel R.; Glenville High School, Cleveland, Ohio..... 1925
Huntington, J. Warren; Haverhill Road, Amesbury, Mass. 1921
Hutchinson, Mrs. Susan W.; 724 So. Orange Drive, Los Angeles, Cal. 1923
James, Mrs. Walter B.; 7 East 70th St., New York 1921
Jayne, Miss Addie; Hampton Institute, Virginia..... 1925
Jellett, Edwin C.; 118 Hermann St., Germantown, Pa..... 1913
Jenks, Charles William; Stonecroft Farm, Bedford, Mass..... 1908
Jennings, Dr. Otto Emery; Carnegie Museum, Pittsburgh, Pa..... 1911

Johnson, Frank W.; 1362 Amherst St., Buffalo, N. Y..... 1925
Jurica, Hilary S.; St. Procopius College, Lisle, Ill..... 1919
Kamm, Mrs. Minnie Watson; 4364 Lakewood Blvd., Detroit, Mich..... 1923
Kaufman, Miss Pauline; 173 East 124th St., New York..... 1900
Keeler, Mrs. L. M.; P. O. Box 473, Scarsdale, N. Y..... 1913
Kelsey, Harlan P.; Salem, Mass..... 1921
Kemp, Prof. J. D.; Schermerhorn Hall, Columbia University, New York 1922
†Kidder, Nathaniel T.; Milton, Mass..... 1921
Killip, Ellsworth P.; U. S. National Museum, Washington, D. C..... 1916
Kimball, Miss Laura F.; Box 50, R. Route No. 1, National City, San Diego Co., Cal..... 1897
Kimber, Miss N. B.; Germantown, Philadelphia, Pa..... 1925
Kinnard, Mrs. L. H.; Wister Road, Wynnewood, Pa..... 1924
Kirkham, Prof. William B.; 100 Mill St., Springfield, Mass..... 1921
Kittredge, Miss E. M.; Box 352, Berlin, N. Y..... 1922
Knappen, Mrs. Theo. M. (Nellie C.); 2925 Tilden St., N. W., Washington, D. C..... 1925
Knowlton, Clarence Hinckley; Hingham, Mass..... 1911
Knowlton, Dr. Frank Hall; U. S. National Museum, Washington, D. C. 1912
Kobbé, Frederick W.; 1155 Park Ave., New York City..... 1921
Landreth, W. G.; Lancaster, Pa..... 1923
Laughlin, Mrs. Charles P.; 333 North Sandusky St., Delaware, Ohio 1925
Lee, Mrs. Eva M.; 55 Logan Road, Bishopstown, Bristol, England.... 1924
Leeds, Arthur N.; Nixon Street, above Leverington Ave., Manayunk, Philadelphia, Pa..... 1921
Leland, George H.; 2 Hunter St., Providence, R. I..... 1921
Lenington, Mrs. Julia; R. D. No. 2, Pomona, Cal..... 1920
Leonard, Emery C.; National Museum, Washington, D. C..... 1920
Lewis, Rev. Charles Smith; 835 Edgewood Ave., Trenton, N. J..... 1917
Lewis, Stella M.; 137 Flower Ave., West, Watertown, N. Y..... 1925
Lewis, Rev. William Fisher; 835 Edgewood Ave., Trenton, N. J..... 1920
Lightfoote, William G.; 13 Masonic Temple, Canadaigua, N. Y..... 1924
Littlefield, Miss Amey A.; 429 Lloyd Ave., Providence, R. I..... 1921
Lippincott, Stanley S.; 802 Columbia Ave., Palmyra, N. J..... 1924
Litch, C. M.; 14 Burnap St., Fitchburg, Mass. 1916
Logue, Dr. Everett G.; 1601 Almon St., Williamsport, Pa..... 1920
Lombard, Mrs. Charles P.; 92 Court St., Plymouth, Mass..... 1910
Lombard, Dr. Robert H.; Geophysical Laboratory, 2801 Upton St., N. W., Washington, D. C..... 1916
Long, Bayard; 250 Ashbourne Road, Elkins Park, Philadelphia, Pa. 1911
Lorenz, Miss Annie; 25 Arnoldale Road, Hartford, Conn..... 1919
Lowe, Mrs. Frank E.; 59 State St., Portland, Maine..... 1917
Lownes, Albert E.; 69 Manning St., Providence, R. I..... 1924
Lyon, Dr. Harold Lloyd; P. O. Box 411, Honolulu, H. I..... 1911
McAvoy, Miss Blanche; Box 109, Foley Road, Price Hill Sta., Cincinnati, Ohio..... 1920
MacCaskill, Allan, Jr.; Coleraine, Victoria, Australia..... 1925
McColl, W. R.; 908 2nd Ave. East, Owen Sound, Ontario..... 1917
MacFadden, Mrs. J. P.; New Denver, B. C..... 1924
McFarland, Prof. Frank T.; University of Kentucky, Lexington, Ky. 1915
Mackenzie, Kenneth K.; 150 Broadway, New York..... 1923

McIntire, Mrs. Jessie; R. 5, Box 515B, 2930 Waverly Ave., Los Angeles, Cal..... 1922
Mansfield, Mrs. Bessie R.; Westboro, Mass..... 1921
Mansfield, William; College of Pharmacy, Albany, N. Y..... 1922
Mark, Miss Clara G.; 270 South State St., Westerville, Ohio..... 1913
Marshall, Dr. Ruth; Rockford College, Rockford, Ill..... 1914
Martin, Everett P.; 85 Wilson Ave., Flushing, N. Y..... 1917
Maxon, Dr. William Ralph; U. S. National Museum, Washington, D. C. 1895
Mendelson, Dr. Walter; 639 Church Lane, Germantown, Pa..... 1910
Merrill, G. K.; 564 Main St., Rockland, Maine..... 1913
Merrill, Henry Wilson; Hiram, Maine..... 1906
Mirick, Miss Nellie; 232 East Walnut St., Oneida, N. Y..... 1896
Mitchell, Mrs. Mina B., M. D.; Box 48, Station A, Chattanooga, Tenn. 1914
Monroe, Prof. Will S.; R. No. 3, Waterbury, Vt..... 1923
Moore, Dr. George T.; Missouri Botanical Garden, St. Louis, Mo. 1915
Morrill, Mrs. Frank A.; 87 Walpole St., Norwood, Mass..... 1916
Morse, Prof. A. P.; Peabody Museum, Salem, Mass..... 1925
Moss, Mrs. C. E.; Box 1176, Johannesburg, South Africa..... 1916
Mottier, Dr. David Myers; Indiana University, Bloomington, Ind. 1911
Mousley, H.; 469 Harvard Ave., Notre Dame de Grace, Montreal, Canada 1920
Mulford, Miss Harriet; 127 Fulton Ave., Hempstead, N. Y..... 1910
Mulliken, Robert S.; Jefferson Physical Laboratory, Cambridge, Mass. 1921
Munger, Dr. Edwin Holmes; 902 Main St., Hartford, Conn..... 1914
Munz, Prof. Philip A.; 1165 Indian Head Blvd., Claremont, Cal..... 1921
Nelson, James C.; 104 E. Wilson St., Salem, Oregon..... 1918
Newell, Chauncey Jackson; Alstead, N. H..... 1902
Noyes, Miss Elmira Elsie; P. O. Box No. 326, Portsmouth, Va..... 1893
Olesen, Olaf Martin; Fort Dodge, Iowa..... 1900
Oliver, Miss Mary H.; 270 S. State St., Westerville, Ohio..... 1920
Osborne, Mrs. Lydia A.; 96 Winthrop St., Winthrop, Mass..... 1924
Osmun, Prof. Albert Vincent; Agricultural College, Amherst, Mass. 1901
Osterlund, P.; 153 Brinkmeyer Ave., So. Ozone Park, N. Y..... 1920
Otis, Ira C.; 4326 First Ave., N. E., Seattle, Wash..... 1921
Overacker, Miss Minnie L.; 127 Robineau Road, Syracuse, N. Y..... 1915
Palmer, Ernest Jesse; 321 South Allen St., Webb City, Mo..... 1909
Palmer, T. Chalkley; Media, Pa..... 1898
Palmer, Dr. Theo. Sherman; 1939 Biltmore St., N. W., Washington, D. C..... 1911
Parker, Mrs. J. H. (Anna C.); 51 Western Ave., Cliftondale, Mass. 1923
Patterson, Mrs. Roberta M.; 422 Randolph St., N. W., Washington, D. C..... 1920
Paull, Miss Agnes M.; Brookdale Farm, Holcomb, N. Y..... 1925
Peckham, Mrs. Wheeler H.; Davenport Neck, New Rochelle, N. Y. 1917
*Petty, Prof. W. J.; 708 Central Ave., Ocean City, N. J..... 1893
Phair, Miss Gertrude G.; 804 East 19th St., Brooklyn, N. Y..... 1916
Pickett, Prof. Fermen Layton, Ph. D.; State College of Washington, Pullman, Wash..... 1914
Plitt, Charles Christian; 3933 Lowndes Ave., Baltimore, Md..... 1898
Pond, Bremer Whidden; 18 Tremont St., Boston, Mass..... 1910
Pratt, Mrs. Charles H.; 86 Aberfoyle Road, New Rochelle, N. Y..... 1926
Pretz, Harold W.; 368 Union St., Allentown, Pa..... 1909

Prince, Prof. S. Fred; State Agricultural College, Manhattan, Kan. 1905
Purdy, Carl; Ukiah, Cal..... 1921
Purdy, F. A.; Hardwick, Vt..... 1921
Radlo, Miss Dora A.; 32 Cherry St., North Adams, Mass..... 1894
Ransier, Herbert Earl; Manlius, N. Y..... 1902
Redles, George; 207 East Wister St., Germantown, Pa..... 1913
Rhodes, Charles Orman; Lock Box 366, Groton, N. Y..... 1896
Richardson, H. H.; 10 State St., Boston, Mass..... 1922
Ridlon, Harry Cooper; Green Mountain School, Bennington, Vt..... 1908
Roberts, Miss Louisa Wright; 520 Roberts Ave., Syracuse, N. Y..... 1915
Robertson, Carl T.; 1626 Holyrood Road, N. E., Cleveland, Ohio.... 1921
Robinson, Dr. Winifred J.; Women's College of Delaware, Newark, Del. 1911
Rooney, Mrs. Anna K.; 368 Lafayette Ave., Brooklyn, N. Y..... 1916
†Rossberg, William B.; 44 Hawkins St., New Britain, Conn..... 1911
Rugg, Harold Goddard; Dartmouth College, Hanover, N. H..... 1906
Rust, Miss Sarah H.; 6 Beacon St., Boston, Mass..... 1922
Ryder, Mrs. Mary D.; 205 Almaden Ave., San Jose, Cal..... 1926
Sanford, Mrs. James R.; 110 East Miller St., Newark, New York... 1926
Sanford, Mrs. R. M. (Olive O.); 528 East Main St., Ravenna, Ohio. 1925
Sanford, Samuel Newton Folius; P. O. Box 702, Fall River, Mass. 1918
Schaffner, Prof. John H.; Ohio State University, Columbus, Ohio. 1920
Scott, James Grimshaw; 123 West Price St., Germantown, Pa..... 1913
Scott, Mrs. Willard; 1651 Beacon St., Brookline, Mass..... 1917
Scoullar, Mrs. Albert E.; Sebago Lake, Maine..... 1904
Seaman, Miss Helen; 11 Winthrop Place, Maplewood, N. J..... 1925
Shreve, Dr. Forrest; Desert Botanical Laboratory, Tucson, Ariz..... 1912
Sims, Robt. J.; Japanese Beetle Lab., Riverton, N. J..... 1923
Smiley, Daniel; Lake Mohonk Mountain House, Mohonk Lake, N. Y. 1922
Smith, Mrs. Frank C.; 47 West St., Worcester, Mass..... 1920
Smith, Lyman B.; 1 Wolcott Terrace, Winchester, Mass..... 1924
Somerville, Mrs. J. H.; Superior, Wis..... 1923
Spalding, Miss Rebecca Wentworth; 2 St. Nicholas Place, New York. 1921
Spalding, Mrs. William; 405 Comstock Ave., Syracuse, N. Y..... 1923
Standley, Paul Carpenter; Smithsonian Institution, Washington, D. C..... 1915
Steagall, Miss Mary M.; 808 S. Illinois Ave., Carbondale, Ill..... 1923
Stearns, Mrs. H. B.; Saranac Lake, N. Y..... 1923
Stebbins, George Ledyard, Jr.; 33 Claverly Hall, Cambridge, Mass. 1926
Steil, Dr. William N.; 188 23rd St., Milwaukee, Wis..... 1916
Stowell, Willard A.; 41 Delawareview Ave., Trenton, N. J..... 1900
Stratton, Mrs. G. W.; 518 Franklin Ave., Wilkinsburg, Pa..... 1916
Stupp, Fred J.; 1 Sherman St., Auburn, N. Y..... 1916
Suksdorf, Wilhelm Nikolaus; Bingen, Wash..... 1914
Swain, Rev. James Ramsey; 428 South 44th St., Philadelphia, Pa..... 1919
Swinerton, John R.; 2115 Chestnut Ave., Newport News, Va. 1909
Talbot, Harry L.; Waverly, Mass..... 1926
Taylor, Dr. Aravilla M.; Lake Erie College, Painesville, Ohio..... 1923
Taylor, Norman; Brooklyn Botanic Garden, Brooklyn, N. Y..... 1922
Tilley, Trenor P.; 1356 Northampton St., Holyoke, Mass..... 1921
Todd, Dr. J. B.; 740 South Beech St, Syracuse, N. Y..... 1915
Topping, D. LeRoy; P. O. Box 2356, Honolulu, T. H..... 1896
Trudell, Harry W.; 2030 East Madison St., Philadelphia, Pa..... 1919
True, Eben; Amesbury, Mass..... 1921
Underwood, Jay Gove; Hartland, Vt..... 1910

Upham, Alan W.; East Woodstock, Conn..... 1926
Upham, Miss Ethel E.; East Woodstock, Conn..... 1922
Van Everen, Mrs. Horace; 13 Kirkland Ave., Cambridge, Mass..... 1923
Van Meter, Miss Mary G.; 1757 K St., N. W., Washington, D. C..... 1923
Victorin, Prof. Marie; Université de Montreal, Montreal, Canada..... 1917
Walton, Rev. A. J.; Box 913, Logan, West Virginia..... 1925
Ward, Mrs. Norman N. (Isadora T.); 618 Berkeley Ave., Orange, N. J..... 1925
Ware, Robt. Allison; 246 Devonshire St., Boston, Mass..... 1903
*Waters, Dr. Campbell E.; 5812 Chevy Chase Parkway, Washington, D. C..... 1893
Watkins, Miss Clara E.; 249 East 30th St., New York City..... 1925
Weatherby, Charles Alfred; 11 Wells Ave., East Hartford, Conn..... 1912
Weatherby, Mrs. Charles Alfred; 11 Wells Ave., East Hartford, Conn..... 1914
Wells, Percy E.; Maples, Ontario, Canada..... 1923
Westley, Edwin; 1395 Morton Ave., Pasadena, Cal..... 1926
Wharton, Miss Susan P.; 910 Clinton St., Philadelphia, Pa..... 1911
Wheeler, Dr. Edward J.; 25 South Hawk St., Albany, N. Y..... 1907
Wheeler, Mrs. George C. (F. H.); 278 Havan Ave., Manhattan, New York City..... 1925
Wheeler, Miss Harriet; Chatham, N. Y..... 1895
†Wheeler, Leston Ansel; Townshend, Vt..... 1914
Wherry, Dr. Edgar T.; Bureau of Chemistry, Department of Agriculture, Washington, D. C..... 1918
White, Kelton E.; 411 North Newstead Ave., St. Louis, Mo..... 1919
Whitman, Mrs. William, Jr.; 17 Commonwealth Ave., Boston, Mass. 1922
Wilcox, Prof. Alice Wilson; Brenman College, Gainesville, Ga..... 1915
Williams, Miss Carrie Hammond; 1428 Park Ave., Baltimore, Md. 1904
Willis, Warren J.; Care Westinghouse Patent Dept., Lester, Pa..... 1923
Wilsie, Elmer, Jr.; Tompkins Cove, Rockland Co., N. Y..... 1920
Winkler, P. A.; 1990 Magnolia Ave., Beaumont, Texas..... 1925
†Winslow, Evelyn James; 222 Grove St., Auburndale, Mass..... 1902
Winslow, Miss Inez J.; Orleans, Vt..... 1911
Woodward, Richard William, 22 College St., New Haven, Conn..... 1915
Worthen, Mrs. Effie Adams; 5 Clarks Road, Amesbury, Mass..... 1921
Wright, Miss Mary F.; Bellfield & Lindley Aves., Logan, Philadelphia, Pa..... 1925
Young, John P.; Ithaca, N. Y..... 1920
Ziegler, S. R.; R. D. No. 4, Dover, Pa..... 1918

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To the Members

Tell others who are interested in ferns about the Society, what it has done for you, and what it has to offer:

Help for beginners; Herbarium specimens and back numbers of fern periodicals which may be borrowed; Occasional free distribution of specimens of rare species; THE AMERICAN FERN JOURNAL: Opportunity for exchange and for getting into touch with others of like tastes.

We want more members: The Society can reach its fullest possibility of usefulness only when all who care for ferns belong to it.

American Fern Journal

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Gathering Ferns in New Zealand

H. B. Dobbie

People unacquainted with the New Zealand forest have no conception how difficult it is to penetrate the tangled labyrinth. It sounds so easy for those accustomed to the trim, orderly forests of Europe to say, "Please gather a few ferns for me." Professor Poirault, of Antibes, when he asked me to procure spore-bearing fronds could not have realized what a strenuous undertaking he was asking of me.

The ground is most uneven, straight from the hand of Nature; it has never been cultivated, or trodden flat by the feet of animals; it is covered with tree roots and so encumbered with fallen trunks and branches, that it would require all one's activity if visible to the eye; but it is ten times more difficult when these pitfalls are hidden under a vigorous growth of bushes, ferns, weeds, and grass sometimes six feet high, the blades wide and stiff with serrated edges as sharp as a razor. At every yard one must force one's way through dead fern stalks (tree ferns), branches, entanglements of a tough cane called "supple Jack," the climbing fern, mange-mange (*Lygodium articulatum*), that catch you round the neck, the arms, waist, legs, and ankles, and cannot be broken

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however hard you tug; or, worst of all, a beautiful climbing pandanus (kie-kie) with dark-green tufts of razor-edged leaves and trailing woody stems that fill a glade with impenetrable masses that must be avoided by a detour.

Progress is hard enough on moderately level ground, but, on steep mountain slopes, it is a continuous athletic feat that brings the muscles of the legs, body, and arms continually into play.

Some of the spore-bearing fronds of the ferns, as *Lomaria filiformis*, are found only up the trees, usually without lower branches, thirty or forty feet above the ground, quite beyond the agility of a septuagenarian; the only chance is to find a fallen tree on which the ferns are still growing. *Lygodium articulatum* is even further out of reach, it sometimes climbs to a height of a hundred feet or more.

The deep precipitous gullies are very difficult to traverse. The bed of the stream holds the only practicable avenue, it is easier to splash through water and climb over rocks than bore a way through the bush. When confronted by a pool more than waist deep, one must climb the bank—usually perpendicular—and fight one's way past the deep water pool. Should the slope be covered with *Lomaria procera* (the palm-leaf fern) with great fronds two or three yards long, it is a herculean task to get through at all, only dogged pertinacity and hard labor will prevail.

One saving grace about the New Zealand forest is the absence of thorns—our bramble does not grow in the dense bush—snakes, and venomous insects.

On one occasion, having been asked by my botanical friends to get specimens of two ferns (*Gleichenia flabellata* and *Loxsoma Cunninghamii*) when visiting the North of Auckland, I met with the following experi-

ences which, no doubt, have happened to other enthusiasts.

Some years ago I found the "Gleichenia" growing in the open some few miles from Whangarei. Although my memory is not to be relied upon for most things, it never fails me about the locality of a rare fern. I went straight to the spot, near the road and in the most desolate, wretched-looking country that did not even grow bracken. I bagged a dozen perfect specimens which I left at a friend's house, and then walked down to the river for the "Loxsoma," only to find myself faced by a turgid, raging torrent. The ferns were on the further bank, not a hundred yards off, but that hundred yards contained a river in high flood. I had crossed it so often, it was such a long, long way round by the bridge through miles of dripping bush—it still rained—this day was my only chance, and I had promised my botanical friends specimens, that I determined to face the flood.

Stripping to my hat and jersey and providing myself with a stout staff, I set out, choosing a spot just above the rapids where the current was not so fierce. With my boots slung around my neck, the kete stuffed full of clothes in one hand and my staff in the other I struggled and slithered down the bank. The water was pleasantly warm, but the bottom, which of course I could not see through the yellow flood, was horribly uneven, at one step I was up to my knees, at the next to my waist. With my bare, tender feet I had the greatest difficulty in keeping my balance on the sharp stones, to have looked at the rushing water would have made me giddy, and I nearly lost heart and turned back; but by this time I was half way across and the further bank, decked with the beautiful "Loxsoma," looked so inviting that I plunged recklessly forward, going in up to my armpits.

It was now easier to go forward than to turn back, so, setting my teeth and keeping my eyes fixed studiously on the land, I persevered, and presently, with a sigh of relief, I grabbed a sapling overhanging the water. Then I clawed up the bank, took off my jersey, wrung out the water, put it on again and dressed.

I got some beautiful plants and herbarium specimens of both the white and green varieties. Placing the specimens in a newspaper that by this time was nearly in a pulp, I tied up the plants securely with flax, lashing them round and round into a bundle as big as a pumpkin, and made my way along the river bank until I struck a path going up hill through the bush.

The forest was most beautiful, restful and quiet after the turmoil of town, presenting at every turn lovely displays of trees and ferns. I followed the path for half a mile and would have gone to the top but for the recrossing of the river which hung over me like a nightmare, for now I was encumbered by the pumpkin bundle—it weighed twenty pounds!

On returning to the river I found "Gleichenia" growing most luxuriantly, and gathered some well-fruited fronds for Professor Poirault, who is trying to acclimatise our New Zealand ferns in France. While so engaged I noticed that a small tree on the further bank had fallen across the river, spanning the main channel with a precarious-looking bridge. On climbing down to the rocks I found I had to cross two smaller channels to reach the bridge. Suspending the kete from the end of my staff, I could nearly reach the first rock, but hesitated to throw it across, for, once over, I could not recover it, I must go on and trust to the rickety bridge carrying me. By this time I was becoming desperate, cross the river I must by hook or by crook, and it was too late to go back to the first crossing, so I pitched the kete over, then the

pumpkin bundle, and succeeded in springing after them. The second channel was wider, but the big rock on the further side on which the tree top rested provided a more spacious landing. I crossed without mishap and then came face to face with the main difficulty.

The river, confined to a deep channel some fifteen feet wide, thundered and roared, I dared not look at it or the tumble of rocks and foam below. I tried the tree, and when it sagged down my heart also sank. Further trials proving that it had come to a firm rest, I prepared to throw my bundles across. The kete did not give me much trouble; swinging it round my head, it landed safely on the further bank. Now for the pumpkin bundle! It was so heavy and round, the steep bank so shrouded with vegetation that I could not see any place where it would be safe from rolling back into the river. However, it availed nothing to delay. Gathering together all my strength I hurled it from me, and came within an ace of heaving myself into the river. It landed on the bank; there was a commotion among the bushes as it rolled back and a heavy splash below the sweeping fern fronds that trailed in the water. I made certain it had trundled back into the river and all my beautiful "Loxsoma" plants were lost forever. No good crying over spilt milk, I reflected, as I approached the precarious bridge to get myself across.

Climbing through the upper branches, I got my feet on the trunk, about six inches thick, smooth, slippery, and sloping down to the water that roared violently underneath, the butt-end of the log being submerged. I first tried to crawl, but found it impossible, the swirling rapid only a few inches below would have caught my legs and swept me to destruction. Rising a little shakily to my feet I extended my arms and began to advance inch by

inch. Thank heaven! the nails in my boots prevented slipping.

To balance oneself on a smooth, round, wet log that sloped steeply would have been hard enough on dry land, but, with a furious torrent rushing underneath, where the slightest waver meant a ducking and bruises if not worse, was a somewhat hair-raising experience.

Fixing my determination that I would not slip I worked my way slowly forward until I was balanced on the slender log in mid-channel. Another two yards and I should reach a branch jutting out above my head, but those six feet seemed an eternity. I thought of making a dash, but decided that "slow and sure" was my only chance. With steeled nerves and muscles set rigid I persevered, not daring to look down for an instant. Never shall I forget the feeling of relief when I grasped the blessed branch, my nervousness vanished, I finished the crossing with ease and was delighted to find the pumpkin bundle in a cranny at the water's edge—it was the flax bandage splashing the water that had deceived me.

So I got safely back to terra firma with all my spoils, and with only one leg wetted when I nearly hove myself into the river. Two days later when unpacking the plants in Auckland I found them in excellent order.

Although I have been studying the New Zealand ferns for nearly fifty years I made the most notable find only the other day. A friend having offered to drive me in his motorcar to Hunua, about thirty miles from Auckland, we set out in no very hopeful mood, for the skies lowered. When passing through Mangere the rain came down in a steady pour.

"We'd better turn back," said I, regretfully. "The bush will be like a shower bath."

"Right-o!" replied my friend. "We'll go by Panmure."

While passing through Papetoitoi the rain ceased and the clouds lifted.

"Now we're out so far," said my friend. "I'll take you to Whitford. There used to be some good bush there."

After crossing a deep, precipitous gully we came in sight of an attractive-looking piece of bush. I left the car, crossed a paddock, climbed down a steep slope and reached a small plateau beside a stream where the cattle had not penetrated. The trees were large and shady and the ferns beautiful. After gathering some "Todea," "Adiantum," and "Nephrodium," I came to a lovely plant of "Lomaria" which, in the subdued light, I took to be "discolor." I gathered a dozen fine fronds which I placed carefully in my basket. While doing so, a hasty glance informed me that it was not "discolor," and had all the appearance of a giant "lanceolata."

On reaching home I looked up the authorities. It proved beyond a doubt to be "Norfolkiana," a fern that has been reported only from The Little Barrier, Three Kings, and Kermadec Islands, but never from the mainland of New Zealand. Needless to say I was greatly elated to think the discovery of this large and handsome fern should have fallen to my job. The tall sweeping fronds are two feet high, four inches broad in the middle, and gradually tapering off at either end. My finding it was the merest chance, and it is remarkable that so striking a plant should have been overlooked for so many years, though growing within seventeen miles of a large city like Auckland.

AUCKLAND, N. Z.

Fig. 1. General view of the main part of "Rock City," a remarkable group of sandstone concretions near Minneapolis, Kansas. The concretions support an abundance of ferns.

Fig. 2. One of the larger concretions, showing the regular sphericity of the concretions and their size as compared with a man nearly six feet tall.

A Remarkable Fern Habitat[1]

JOHN H. SCHAFFNER

During the summer of 1925, the writer had the opportunity of again visiting the place which he regards as the most wonderful fern habitat that he has ever seen. This habitat is a field of huge sandstone concretions weathered *in situ* out of the Dakota sandstone which is the rock formation of the region. These concretions are commonly known as "Rock City" and are situated three miles southwest of Minneapolis, Ottawa county, Kansas. The concretions are mostly from 6 to 12 feet in diameter and for the most part quite spherical in shape. They show the natural stratification and cross bedding of the sandstone and contain numerous small crevices and cracks.

The accompanying illustrations (plate 6), from photographs taken by the writer in 1900, show the main part of the "city" and the size and character of the concretions. This fern habitat is presented as entitled to the claim of being the most remarkable one on the continent.

Now for the ferns. The concretions both on the shaded and exposed sides contain a profusion of *Pellaea.* Since the region is on the line in which *P. atropurpurea* (L.) Link, Southern Purple Cliffbrake, and *P. glabella* Mett., Northern Purple Cliffbrake, overlap, both of these species are present. These identifications have kindly been verified by Professor Frederic K. Butters, of the University of Minnesota. The plants on the south side of the concretions are exposed to the intense heat, often too hot for the bare hand to endure, and the bright sunlight characteristic of the Kansas transition prairie and at times to very extreme drought for long periods. Yet

[1] Papers from the Department of Botany, The Ohio State University, No. 167.

many of them are thriving fairly well under the circumstances, although others, especially those in shallow crevices, are very stunted and of a greenish-bronze color. *Pellaea atropurpurea* also grows abundantly on large weathered boulders derived from the thick layers of Permian limestone, at Gatesville, Clay county, about 50 miles east of "Rock City." Here the plants commonly occur in little pits or pockets of the smooth solid rock which has no cracks or seams. These pits are usually an inch or two wide and of about the same depth. The glaring chalky-white of the limestone must give the ferns even more extreme conditions of light, heat, and drought than those at "Rock City" must endure. Yet it was surprising to see fairly vigorous plants in very shallow pockets, exposed all day long to sunlight. Their root systems must have been comparatively short, while the plants on the sandstone concretions of "Rock City" probably penetrate deeply toward the centers of the rock spheres.

At the extreme western end of the "City" several concretions were carpeted on top and in the upper crevices with that peculiar little fern, *Cheilanthes feei* Moore, Fée's Lip-fern. The leaves of this lip-fern when seen from above have the appearance of a collection of tiny green beads and the dense, light-brown cushion of hairs on the under side often obscures the sporangia completely. This fern was collected from these concretions by the writer in 1901 and identified by Dr. L. M. Underwood, who did so much to popularize the study of ferns in America. Dr. Underwood also identified *Notholaena dealbata* (Pursh) Kunze, Powdery Cloak-fern, which was collected from the concretions in 1900, while the writer was making a 400-mile collecting trip, in central Kansas, in the old-style top-buggy. The past summer the trip, including the detour to "Rock City," was by automobile

and covered 4,000 miles. How times have changed in a quarter century! No *Notholaena* was seen the past summer, but it may still be present, since no careful search was made, no ladder being available to reach the tops of the large concretions at the west end. The powdery cloak-fern is also an odd little plant. From above it appears like a very diminutive *Pellaea*. But the waxy-powdery material on the underside of the leaves gives the plant a chalky appearance, making recognition easy.

There are, therefore, four species to the credit of this peculiar sandstone formation, which is an exceedingly good showing for a region where one may walk for many miles, with never a sight of a fern, usually to be rewarded finally by but one or two species growing around some far-isolated spring or on some special overhanging, shaded ledge of a creek or deep ravine. Who can show a more remarkable fern habitat than that presented by this field of Titan marbles of the prairie?

COLUMBUS, OHIO

On the Trail of Equisetum for Four Thousand Miles[1]

JOHN H. SCHAFFNER

Knowing that most of the species of Equisetum of eastern North America are to be found in abundance in the region of the Great Lakes and having read the alluring literature of the Michigan Tourist Associations, the writer decided to make an extensive tour in the summer of 1925 with his family, by automobile, with the primary purpose in view of studying horsetails in their native

[1] Papers from the Department of Botany, The Ohio State University, No. 167.

haunts. The trip was begun from Columbus, Ohio, on July 5.

Just north of Columbus, Indian Springs ravine was passed where *Equisetum praealtum* and *E. arvense* grow in great abundance. Here many interesting observations on our two most common species have been made for many years. *E. praealtum* covers the wide ravine bottom in various places like a thick stand of tall grass, competing successfully with bluegrass, blackberries, and other plants, since most of the trees have been cut down years ago and the ground has not been pastured. The largest patch covers more than an acre of ground. The plants are usually from 2 to 4 feet high and rigidly erect. The branches developed on erect stems are also rigidly erect, growing up close to the main stem. At whatever angle the main stem is bent over the branches developing on it are perpendicular to the surface of the earth. The branches produce small cones abundantly. The main stems often produce zones of nodes without appreciable internodal development or with very short internodes. This development is entirely sporadic and may occur at several points on the same stem. Occasionally dichotomous tips with two cones are produced but they are difficult to find. In winter the internodal cavities are often turgid with water which in cold weather freezes into solid cylinders of ice. Many stems take on a dull reddish color on the side exposed to the winter sun. This color is not anthocyanin but is due to a red pigment in the chloroplasts. The main blooming period is in June, although isolated cones may be shedding their spores from May to September. Young cones of various sizes can be collected at any season of the year. Very few cones are produced in the drier parts of the patch. The mature cones vary in size all the way from minute structures no larger than

pin heads to the perfectly developed cones three fourths inch long and one half inch in diameter. The smaller cones do not develop spores, in fact the merest rudiments of sporangia are produced. The intermediate sizes are usually semi-sterile and produce imperfect spores. This variation in the development of the cones in every gradation from vegetative tip to sterile, semi-sterile, and fertile structures is characteristic of various Equiseta and is, no doubt, the basis for the reports of supposed hybrids and many special varieties. These semi-sterile shoots indicate the low position of Equisetum in the evolutionary scale of the vascular plants. In the higher plants there is usually a definite vegetative shoot or a definite flower. There is no intergrading series. In the lower Equiseta the number of whorls of sporophylls and also the number of sporophylls in a whorl are variable, just as is also the case with the number of sheath segments and teeth. In the higher Equiseta the tendency is to have the numbers more constant.

Having passed our favorite wild Equisetum garden, the main observation in northwestern Ohio and southern Michigan was the widespread abundance of *E. arvense*. It grows in all sorts of situations—along brooks and streams, in meadows and woods, in sandy places, and especially on railroad embankments. It may be regarded as the highest species and the most successful one, with the widest distribution over the earth. The habit of its body is as diverse as its habitat. In the woods it is often a tall, erect plant with regular whorls of simple branches standing out at right angles to the main stem or sometimes slightly drooping. The branches may be compounded to various degrees. In the open the plant often forms dense tufts or reclining, irregularly branched masses. On sand the form is frequently a perfect mat with prostrate stems and branches radiating from the

center and closely applied to the substratum. There are all gradations from fertile to sterile shoots but the intermediate forms are rare and it was much too late in the season to find any.

In several places near Ann Arbor, *E. praealtum* was noticed and after turning north toward the region of the conifer forest, which originally covered the Great Lakes area, the search for horsetails began in earnest. At Johnson's Landing, in Genesee county, *E. laevigatum* was found in fruit, in abundance, along with *E. arvense*. Northwest of Midland, *E. praealtum* was collected on the high river banks. At Clare, farther on, *E. arvense* was taken simply as a souvenir of the locality.

East of Houghton Lake, some distance north of Prudenville, a great abundance of *E. fluviatile* was found. Both types of shoots, the unbranched and those with whorls of branches, were present. In central Ohio the plants usually have the whorls of branches. As one goes northward the simple-shoot type seems to become more abundant—the so-called variety *E. limosum*. Both types of shoot come from the same rhizomes, so the unbranched form should not be called a variety. In Ohio the cones of *E. fluviatile* show abundant proliferation, frequently with a second cone at the tip. These proliferated cones are usually imperfect. At Houghton Lake the tall sterile plants showed the slender, spiral and coiling tips which are frequently developed in this species. The coils may be more or less circinnate or spiral, or they may be merely flexuous or hooked or bent in various ways. These coils are often intertwined or coiled about some other plant. The coiling tip is usually from one to four inches long. There is probably no twining by contact. I have seen these slender coiling tips at various times but never in such abundance and with such perfect spirals and coils.

At Gaylord, in Otsego county, the banks of a railroad cut going through the forest were covered with large *E. praealtum*. On examination, they were found mostly to be decidedly bent and curved. This was in striking contrast to the rigidly erect condition characteristic of the species. I tried to discover the reason for the curved stems and concluded that they might have been bent through the gradual melting of heavy snow, either drifted or thrown upon the plants by snow ploughs.

Coming to the south end of Burts Lake, in Cheboygan county, I examined a wooded marshy shore with old fallen trees and decaying logs, and soon found abundant patches of *E. scirpoides*. This low tufted plant with its numerous dark-green, slender, curly flexuous shoots is of special interest in many ways. The wavy-curly tufts show extreme specialization away from the straight erect growth of its more primitive relatives. The stems turn rather whitish when old, which contrasts strongly with the dark green living portions. The shoots are quite uniformly grooved and the sheaths three-toothed. The six ridges appear to represent three original ones, which have become double by the development of a central groove in each ridge. The cones are very small, as one would expect on such small shoots. The constancy of the ridges and teeth is in striking contrast to the variability of these structures in *E. laevigatum* and *E. praealtum*.

A single little plant of typical *E. variegatum* was found in this swampy woods. Thinking that there would be an abundance of it further north no further search was made for it. Great was my surprise when I was unable to find it again during the entire journey. I looked in every conceivable place and habitat, but it eluded me. All of the other ten species of eastern North America were seen at various times but no more *E. variegatum*.

One of the excuses for making the trip was to be able to visit the University of Michigan Biological Station on Douglas Lake in order to study *Equisetum nelsoni*. Through the kindness of Dr. John H. Ehlers, of the University of Michigan, and Dr. George E. Nichols, of Yale University, I was able to visit habitats where various species grew in abundance. We collected *E. scirpoides*, *E. nelsoni*, *E. arvense*, *E. praealtum*, *E. silvaticum*, *E. laevigatum*, and *E. palustre*. Besides these *E. fluviatile* and *E. variegatum* are also found in the region but were not collected. A careful study of *E. nelsoni* in the field convinced the writer that it is well entitled to specific rank.

In a boggy swamp in an abandoned road passing through a forest, near the shore of Burts Lake, was a wonderful stand of *Equisetum palustre*. A great number of forms was collected growing in various habitats and in various degrees of light and shade. The forms ranged from tall plants with regular whorls of branches, through bushy and irregularly branched forms, to small unbranched shoots of various sizes. The species has a very wide range of habit. This patch of *E. palustre* provided an unusual opportunity for studying the cones which were in full bloom (July 10). The mature cones are of all sizes from as large as pin heads on very slender tips to the normal large cones on robust shoots. There is in *E. palustre* a complete gradation from fertile shoots through semi-sterile shoots to the ordinary sterile shoots. The semi-sterile small cones are very common. I am now convinced of what I had tentatively concluded from a study of herbarium material, both from Europe and America, that *E. litorale* is not a hybrid nor a species but merely the ordinary semi-sterile shoots of *E. palustre*. It is probable that all of the supposed hybrids of Equisetum, based on defective sporangia and spores, are

all merely examples of semi-sterile shoots which develop from the same rhizomes as the normal fertile shoots. Morphological studies on the cones of Equisetum must also take account of this condition of affairs, for it is probably the basis for the diverse types of sporangium development which have been reported. One could probably obtain a normal, developmental series by selecting the young cones from shoots with large robust tips. Any cones taken from slender-tipped shoots will probably be semi-sterile or sterile.

After crossing the straits of Mackinac we made our first camp about thirteen miles north of St. Ignace. Besides the ever-present *E. arvense*, *E. scirpoides* was abundant. While walking along a north-facing bluff of the Carp River I saw my first *E. pratense*, growing in its native habitat. This is a most delicate and beautiful species of a pale gray-green color, with symmetrical whorls of simple thread-like branches which put one in mind of spider webs arranged in tiers. It is very easily distinguished from *E. arvense*, both in the field and in herbarium specimens, not only because of its filmy appearance but especially by the triangular white teeth which are without the subulate point characteristic of *E. arvense*.

At Sault Ste. Marie, *E. silvaticum*, *E. fluviatile* and *E. palustre* were collected. *E. fluviatile* was mostly of the unbranched form and many shoots showed the coiling tips. A great variety of forms of *E. palustre* was growing in grassy meadows, in ditches and on the sandy shore of St. Mary's River—tiny tufted forms with unbranched shoots, tall unbranched specimens, and the usual run of irregular shoots and shoots with regular whorls of branches. The cones also showed all gradations in the various habitats, from perfect cones to the minut-

est sterile strobili. Here was also collected a specimen with a spiral sheath, extending around the stem for over an inch, with a spiral row of lateral branches. These forms in which the sheath develops as a spiral are occasional in *E. palustre* and can often be found by diligent search.

On the shore of Mille Coquins Lake, *E. palustre* was abundant and in full bloom. The cones were again in all grades of size and perfection from those normal and fertile through the various degrees of semi-sterile ones over to the completely sterile tips. At Rapid River Falls Park, northwest of Rapid River, in Delta County, *Equisetum pratense* was rather common and besides the typical form, low irregularly branched tufted specimens were found growing on the bare sand of the roadside. However, it is apparently not so variable in form as *E. arvense*. The locality also yielded the following species: *E. scirpoides, E. silvaticum* and *E. arvense*. At Munising, on the Lake Superior shore, *E. laevigatum* was collected.

At Michigamme, just below the beautiful state camp site and park, *E. fluviatile* covered great areas of marshy ground. It was nearly all of the "limosum" type with unbranched shoots. Only here and there would a shoot appear with the typical whorls, although many would have a few isolated short branches at some of the nodes. Dense tufts of small delicate shoots of this species were also collected on the bare sand. They would be difficult to identify by their morphological characters, especially when dried.

West of Michigamme, along a sandy roadside cut through the conifer forest, *Equisetum silvaticum* occurred in abundance. There were all gradations of form from prostrate mats on the bare sand through irregularly

branched and tufted individuals to the well developed shade forms with symmetrical whorls of branches. Those in the dry exposed sand were of a decided yellowish tint.

Shirley Hibbard has called the wood horsetail "the most elegant of all the plants upon the face of the earth." In typical shoots the branches of the whorls spread out horizontally in broad circular disks with slightly drooping margins forming a series of horizontal platforms, which usually become smaller toward the top, giving the whole plant the appearance of a symmetrical conifer. The whorls of branches are horizontal with the surface of the earth even if the stem is inclined. They form a striking contrast to the rigidly perpendicular branches of *E. praealtum*. In its perfect form it is certainly a graceful and elegant plant, but is not so delicate and ethereal in aspect as *E. pratense*.

At Millicent Lake, near Iron River, Wisconsin, *E. arvense, E. praealtum, E. silvaticum,* and *E. fluviatile* were found. The *E. fluviatile* was largely of the simple-stemmed form.

North of Duluth, at Twin Harbor, Minnesota, *E. fluviatile*, both the branched and the unbranched form, was collected and an assortment of *E. arvense*. Among the special forms of the latter species were mats and a most delicate, symmetrical, erect type, four to eight inches high, with whorls of short rigid branches standing out nearly at right angles and from one third inch to one inch long. Many such forms have received formal names but I believe this is a waste of energy and a great detriment to systematic botany. We certainly do not want to name our individual plants in the way we give pet names to our cats, dogs and canaries. There has been much naming of fluctuating branches in Equisetum. It makes one shudder to think of what would happen to our manuals

if systematists should begin to describe and give formal names to all the diverse types and forms of branches to be found on our trees and other branching species.

After passing northward along the lake shore as far as the Manitou River we turned southward and at Farmington, Minnesota, found a large patch of *E. kansanum* in a little prairie on sandy loam. Accordingly, this species was studied for the gradation series of semi-sterile shoots and cones. Every gradation was collected, ranging from semi-sterile shoots with cones as large as small pin heads to the normal, spore-producing strobili. As stated above, the presence of defective cones, sporangia, or spores in Equisetum is no indication of hybridity. The way to find out what hybrid Equiseta would be like is to produce them under controlled conditions.

Near Harris, Minn., both *E. praealtum* and typical *E. laevigatum* were collected. Further on, near St. James, *E. laevigatum* was growing among prairie grass on a typical Andropogon prairie, much as one finds *E. kansanum* in southern Nebraska and northern Kansas. *E. arvense* was also growing as a normal member of the prairie association.

Two days were spent at Lake Okoboji, Dickinson County, Iowa, and thanks are due to Dr. Geo. W. Martin, of the Iowa State University, for aid in locating horsetails of this region. *E. arvense* and *E. kansanum* were collected, the latter both in typical prairie and on the lake shore. *E. praealtum* and *E. laevigatum* have been reported and no doubt occur in the locality but were not seen by the writer. After leaving Lake Okoboji, *E. kansanum* was collected in a gravel and sand pit near Dennison, Iowa, and west of Omaha, Nebraska, vigorous *E. laevigatum* was found in a railroad cut. South of Lincoln, *E. kansanum* was abundant in a natural prairie.

We finally arrived at Morganville, Clay County, Kansas, where the writer first became interested in Equisetum because the plants were so different from everything else in the region, and because the most common species present would not fit the key and descriptions in the manual. Many years after these plants were described as *E. kansanum*. The original habitat of the type locality has been turned into a pasture for a number of years and the cattle have browsed the plants so persistently that only small tufts could be found. The species was, however, abundant on ungrazed, mixed *Andropogon furcatus-A. scoparius* prairie in various places. *E. laevigatum* is abundant in the bottom land of the Republican River and often persists for years in cultivated soil. Both *E. arvense* and *E. praealtum* have been collected in the past in Clay County but none were found.

After staying for a month on my farm, a trip was made through western Kansas. After leaving Clay County and passing through Grainfield in Gove County and Dighton in Lane County not a single Equisetum was seen in the 572 miles traveled until we reached Emporia in Lyon County, except at one place. West of Ness City, Ness County, I observed a high, steep, north-facing bluff along a creek which looked like a suitable habitat and on investigation it was found to harbor a considerable quantity of *E. kansanum* growing among the *Andropogon scoparius*. Of course, with special search some Equisetum would have been found at other places, but Equiseta and all other pteridophytes are exceedingly rare. Three years ago the writer collected *E. laevigatum* on a sandy bank of the South Fork Solomon River near Penokee, Graham County, and in Colorado near the foothills *E. kansanum* is often abundant along the sand-filled stream channels. At Emporia, Lyon County, *E. praealtum* was found to be common on river banks.

At Marshall, Missouri, *E. arvense* and *E. laevigatum* were abundant in a sandy creek bottom, and at Warrenton, Warren County, giant specimens of *E. praealtum* were collected, growing in a ditch in the flood plain of a creek. Some of these plants measured five feet eight inches tall and were one half inch in diameter. Similar large specimens were seen in the Missouri River valley near St. Charles. Near Effingham, Illinois, *E. arvense*, *E. laevigatum* and *E. praealtum* were abundant, the latter sometimes measuring one half inch in diameter and slightly over six feet in height.

Having collected all of the common species many times and feeling quite certain that only two other species could possibly come into the region bordering the road home, namely, *E. fluviatile* and *E. kansanum*, no further time was taken for botanizing.

The final drive was made on Sept. 7 from Teutopolis, Illinois, to Columbus, Ohio, where we arrived safely in the evening, the speedometer indicating that from the departure to the return something over 4,000 miles had been covered, yet we had barely reached the half-way line across the continent.

COLUMBUS, OHIO

The West Virginia Locality of the southeastern Relative of Woodsia scopulina

EDGAR T. WHERRY AND FRED W. GRAY

In a recent publication[1] Professor M. L. Fernald includes the following footnote to the discussion of the distribution of *Woodsia scopulina*:

[1] Persistence of plants in unglaciated areas of boreal America. Mem. Am. Acad. Arts Sci. 15: 250. 1925.

"The Nipissing and Gaspé plants are quite inseparable from the typical cordilleran specimens. A fern of West Virginia has recently been identified with *Woodsia scopulina*, but the West Virginian material at hand departs in some fundamental characters from the western and northeastern material of *W. scopulina* and seems to represent another species."

In view of the interest connected with this occurrence and the fact that the exact locality has been in doubt, the following notes on it seem worth publishing. The writers succeeded in relocating it in August, 1924, finding it to lie four kilometers (two and a half miles) northwest of Sweet Springs, along a fairly good mountain road.[2] The fern proved to grow on dry shale cliffs which face west and rise, with interruptions, to a height of fifty meters or more. The soil reaction is minimacid to low subacid, specific acidity 5 to 25. Associated species are: *Asplenium platyneuron, A. trichomanes, Cheilanthes lanosa, Dryopteris marginalis, Pellaea atropurpurea, Polypodium virginianum, Polystichum acrostichoides,* and *Woodsia obtusa.* About 200 clumps are scattered over this group of cliffs, both in sun and in shade, but the plant could not be found anywhere else in the region. The illustration shows its mode of growth.

The variability of the *Woodsia* through this small colony is striking. The stipe is usually deep, occasionally pale, brown; the rachis ranges from greenish gray through straw yellow to brilliant deep brown. Although hairs and scales are present on the rachis and veins of the fronds on all the plants, they are sometimes so sparse as to be found only by careful search, while again they are abundant and conspicuous. In size there is a wide range, fruiting fronds as small as one and a half by

[2] Our thanks are due to Rev. W. A. Benfield, whose Ford solved our transportation problems. A second visit was made (by F. W. G.) in 1925.

A Relative of Woodsia scopulina in West Virginia

seven centimeters (stipe included) being observed, while the largest were 37 cm. long. The frond-outline is lanceolate to oblong- or even ovate-lanceolate, and its tip varies from acute to long-acuminate; similar variation is shown by the pinnae. In some fronds the pinnae are set close together, even overlapping to some extent; in others they are separated by gaps of twice their width, and in number they range from seven to thirty pairs.

It is interesting to note that two other rare plants growing on these cliffs—Golden-buckwheat (*Eriogonum alleni*), which appears in the illustration to the left of the fern-clump, both above and below, and Everlasting-ragwort (*Senecio antennarifolius*)—are likewise near relatives of Rocky Mountain species.

WASHINGTON, D. C., AND CASS, W. VA.

Down Deep

LUCINA HAYNES LOMBARD

When I revisit a farm, well-known to me in childhood, it is always to rediscover something that I only partly knew before.

This last season it was the ferns in the well. This "wishing well" is picturesquely situated on the lowest hillside terrace, below the farm-house, its "iron-bound bucket" swinging from its sweep, as did that typified by the well-known song-poem.

Seventy-five years ago, this refreshing spring of crystal-clear, cold water was walled up with small granitic boulders from the adjacent brookside. The encircling rock-rim was hemmed about the top firmly with turf, the soil black and peaty.

On this foothold, ferns are lodged, fastening themselves with sweet familiarity, and holding like snow. Their fronds droop gracefully over the margin. Below, for several courses, the rocks are coated with emerald moss. The water gently percolates through the gravel and clay of the hillside, so that the rocks are always dripping with moisture, and often bathed in "spills" from the overflowing bucket.

Through the midsummer heat they keep their tender, individual greens as if painted. In purity of tint, they rival the blue of the sky, to which they may look overhead, with stars twinkling for company in the evening, and daytime glimpses of birds flying over, or perched on the wooden well-curb, singing. As one leans down to look at them, they give a delightful sense of being alone with nature in one of her most intimate moods.

When specimen fronds were kindly procured, so that these acquaintances, whom we had known "by sight" for many years, might now be formally introduced by their scientific names, we were surprised by the number of species which made their bow as they took their places.

The sensitive fern (*Onoclea sensibilis*), which was firmly entrenched on the steep bank outside, had sent inquisitive runners to spy out the situation in the dim light within.

Associated with it is the long-stemmed marsh shield fern (*Dryopteris Thelypteris*), as in the grassy wet bottom of the brookside, where they unite in forming a fern meadow.

Thrifty individuals of the dark olive wood fern—the intermediate variety of the spinulose fern which flourishes on decaying stumps and old logs in the half-shade of nearby deciduous trees,—present exquisite fine-cut fronds, a marvel of point-lace work. Delicate and yet hardy, persisting green in winter, they contrast pleas-

ingly with the narrower dark green leaves of a solitary plant of the typical *Dryopteris spinulosa,* sometimes mirrored in the clear brown water of the stream, so far does it edge forward.

But we had not reckoned on one fern that came to our hand, the dainty and beautiful, tiny, rock-loving fern, maidenhair spleenwort (*Asplenium Trichomanes*), scanty tufts of which nestled under the shelter of var. *intermedia,* close to the circumference of this unique fern garden, as cozily as in the same company in its outside habitat.

GORHAM, MAINE

ASPLENIUM GRAVESII IN WEST VIRGINIA.—In September, 1925, while collecting *Asplenium pinnatifidum* at a station near French Creek, Upshur County, West Virginia, discovery was made of two bunches differing radically from the type. Examination led to the identification of these ferns as the hybrid *Asplenium Gravesii,* a conclusion kindly confirmed by Dr. E. T. Wherry.

The station is in dense deciduous woods on an outcropping sandstone ledge. The elevation is around 1,600 feet. One parent of this hybrid, *A. pinnatifidum,* is common in the locality, but so far a careful search has failed to reveal the other parent, *A. Bradleyi.* This latter species has been recorded for the state by Mr. F. W. Gray, but his station is some two hundred miles to the south.

Specimens collected were marked by a distinctly brown stipe, and sori of much deeper brown than in *A. pinnatifidum.* Certain individuals were almost three times pinnate.

So far as the writer knows this is the first record for the occurrence of this fern in West Virginia. Specimens

have been deposited in the National Herbarium at Washington.—MAURICE BROOKS, *French Creek, W. Va.*

AZOLLA CAROLINIANA WILLD. IN UTAH.—Some years ago the writer made a collection of this plant at Provo, Utah, in an irrigation ditch near the D. & R. G. railway station. When a few years later the plant was again looked for, it was found that a cement gutter had supplanted the irrigation ditch, and of course there was no sign of the Azolla.

In the spring of the current year, Mr. Briant Decker, instructor in Botany at B. Y. U. of Provo, sent to the writer some specimens for identification, which proved to be *Azolla.* They had been collected west of Provo, near Utah Lake. Some of these plants were sent to Dr. Wm. R. Maxon, of the U. S. National Herbarium, who writes that the plants seem to be *Azolla caroliniana.* Later, specimens were sent to Dr. Ralph Benedict for culture work.

The presence of *Azolla* in Utah is not recorded in any of the botanical manuals, hence this note will extend the known range of the plant.—A. O. GARRETT, *Salt Lake City, Utah.*

A REMARKABLE FORM OF WALKING FERN.—We illustrate herewith an extraordinary form of the walking fern discovered at Florence, Vermont, by Miss E. M. Kittredge in 1924. Miss Kittredge writes that the fronds grew curled and twisted with each other and with other plants. The great development of the auricles is particularly noteworthy. To find anything else quite so bizarre and unlike the normal build of its species, we should probably have to turn to the slashed and contorted forms of hart's-tongue described in British fern books. It is to

A Remarkable Form of Walking Fern

be hoped that some Vermont fern-lover will be able to keep this plant under observation and record its behavior in successive years.

American Fern Society

Dr. John B. Todd, of Syracuse, N. Y., writes interestingly of the work done by him and his associates in transplanting hart's-tongue ferns which were in immediate danger of destruction by quarrying operations. His letter was intended to be read at the Vermont field meeting of the Society, but it was unfortunately sent to one of the editors who was not there and it never reached the meeting.

Most of its story has already been told in the preceding number of the JOURNAL by Dr. House; space permits us to print here only the two paragraphs following.

"The ferns have been planted about a year and today [July 1, 1926] we inspected them and found most of them growing finely and looking entirely 'at home' in their new location.

"Much has been learned from observing how the Scolopendriums grow best, which is on a talus slope of corniferous limestone that has accumulated a bed of leaf mould. The fern roots extend back under the stone in the spaces filled with leaf mould. The stones condense the vapor that arises, and in that way provide water for the ferns. In planting the problem was to find a secluded, shaded talus slope filled with leaf mould, and to plant, one had only to lift the edge of the stone and tuck the fern roots underneath in the leaf mould."

This ought to be helpful to those who are endeavoring to naturalize the hart's-tongue in wild habitats.

Miss Lombard, the author of the article "Deep Down" in this number, would like to know if others have found other species growing in wells than those she records. So would the JOURNAL. The writer remembers having once seen a paper by a European botanist on ferns which grow in caves in his country. I recollect that he found *Cystopteris fragilis* could get along with less light and therefore grow farther in the caves than any other species; but I cannot recall the name of the author or the place of publication of his article. Perhaps some reader of this can supply the missing information.

We are much indebted to Prof. Schaffner for the loan of the two blocks used in plate 6. In this number, also, we welcome with pleasure our first contributor from New Zealand; we trust he will be by no means the last.

We have had stories of unusual fern finds and hope to have many more; the articles in this number by Prof. Schaffner and Miss Lombard suggest another subject for similar notes—namely, unusual fern habitats. Probably no one can produce anything quite so queer as Prof. Schaffner's giant marbles, but many of us have doubtless found ferns growing in strange places. "Please tell us," to quote Mr. McColl; we shall be interested.

Prof. Schaffner's account of his journey in search of Equisetum suggests another promising field for observation—the numerous and often striking growth-forms produced by several of the species of horsetails. As he says, these forms may not be worth naming—that question may be left to the professionals to fight out. But they are certainly worth observation as showing the responses of the

plants to different conditions of environment; it is to be hoped that they will be looked up and reported upon by those of us who are willing to give the close attention often necessary to name accurately some of the species of this genus.

With the issue of this number the JOURNAL's copy-drawer is nearly empty. Prospective contributors will confer a favor not only on the editors but on the readers of the JOURNAL by sending in their articles as promptly as possible.

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E. J. WINSLOW C. A. WEATHERBY

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James H. Ferriss, 1849–1926

American Fern Journal

Vol. 16 OCTOBER–DECEMBER, 1926 No. 4

James H. Ferriss

James Henry Ferriss, a member of the Society for the past twenty-five years, its vice-president in 1904, and its president from 1905 to 1908, died suddenly at his home in West Park, Joliet, Illinois, March 17, 1926, in the 77th year of his age.

James H. or "Jim," as he usually signed himself, was the eldest child of James Hazard Ferriss and Eliza (Brown) Ferriss, and was born in Kendall Township, Kendall County, Illinois, on November 18, 1849. His father was a cattle-buyer and young Ferriss grew up in the same business. In 1869, when he was about twenty, he went to southwestern Kansas, where he took up two claims and incidentally packed freight, herded cattle, operated a trading post in the Indian Territory, and entered into many other phases of frontier life.

Tiring of Western life, he came to Joliet in 1872 and took a position on the *Joliet Sun* as market reporter. This was his first essay at journalism but one quite to his taste since it dealt with cattle. In two years, however, he longed for wider fields and moved to Yorkville, Kendall County, near his birthplace, where he set up a paper of his own. After three years' experience at this, he returned to Joliet to take charge of the *Joliet Phoenix*,

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[Volume 16, No. 3 of the JOURNAL, pages 71–102, plates 6–8, was issued Sept. 28, 1926.]

but a few months later, in conjunction with Horace E. Baldwin and Robert W. Nelson, the latter now head of the American Typefounders' Company, purchased the *Joliet News* for $225.

The development of this publication from a rather unpromising weekly to an influential modern daily was his principal life-work. In the beginning, however, he did not take kindly to the daily grind on an ordinary paper, and in three years had sold out his interest to his partners and gone to Portland, Maine, to edit a paper in the interests of prohibition, backed by the celebrated Neal Dow. In 1882 he was back on the *News* again as part owner, and thereafter continued as its editor until its combination with the *Joliet Herald* as the *Herald-News* in 1915. His later years were passed quietly at West Park or in exploring various out-of-the-way places in the South and Southwest in search of botanical and other specimens.

Mr. Ferriss was a man of strong and unusual characteristics. Unselfish, sincere, and of unquestioned honesty, he was a loyal friend and a stubborn foe. He was always outspoken on the side of right, regardless of its popularity. In his editorial capacity, he was a strong advocate of prohibition, woman's suffrage, child welfare, and the like, and for nearly half a century there was scarcely a public improvement in his adopted city that did not owe much of its success to his effort. Especially dear to him was the promotion of parks, playgrounds, schools, libraries, museums, and similar phases of civic betterment.

Too busily engaged in advancing the interests of others to think of himself, he made no effort to put himself forward and held no public office except that of Park Commissioner, though his interest in politics made him Chairman of the National People's Party in the 1904

convention that nominated Thomas E. Watson for president. In his home town he was regarded as one of its foremost citizens and was a member of numerous societies and clubs.

Although always a lover of nature, Mr. Ferriss' scientific interest in natural history did not develop until comparatively late in life. He was a man grown before his collecting instincts were awakened by the discovery that there were a number of different varieties of mussels in a nearby stream. He at once began making a collection of these and in the search for additional specimens scoured the country far and wide.

Numerous expeditions to Arizona were to virgin fields from which he returned with hundreds of species unknown to science. Most of these were named in conjunction with other conchologists, but not a few bear his name, and he has the added distinction, in *Ferrissiella Ferrissii*, of having a genus and one of its species named for him. His private collection of land and fresh-water shells is one of the most complete in America and abounds in type specimens. After the shells, ferns and cacti interested him. In both groups he brought together unusually large collections. The collection of living cacti in West Park, secured largely through his efforts, is exceeded by only one or two others in the country.

Denied the advantages of a formal education, Mr. Ferriss made up the handicap by great native ability, unusual industry, wide reading, and incessant study. He came to be an acknowledged authority in several branches of science and was a friend and correspondent of many of our most eminent biologists. He held membership in a number of scientific societies, among them the American Association for the Advancement of Science, American Fern Society, Illinois State Academy of Science, and the Izaak Walton League. He served one

term as Vice-President of the Illinois State Academy of Science, and was an Honorary Member of the Joliet Botanical Club. His name appears among the five citizens of Joliet in that roster of fame, the American Who's Who.

Mr. Ferriss was one of the original Commissioners of the Joliet Park District. As Chairman of its Landscape and Planting Committee, he did much to promote the beautifying of the waste places. To the development of this work, he brought the same tireless industry that characterized his other activities and spent much time and labor in securing plants and in their subsequent cultivation. He was the chief advocate of the educational phase of park work and at the time of his death was arranging for a forestry school and a building to contain library, museum, art-gallery, and lecture rooms.

To fern students, Mr. Ferriss is known as an exceptionally sharp-eyed collector, who brought home many interesting forms from the arid regions of the southwestern United States. Probably his most noteworthy find was a fern which was at first thought to be a new species, but which turned out to be something even more remarkable. It is identical with *Asplenium alternans* Wall., a species which is otherwise known only from the Himalayas and Abyssinia and which furnishes one of the most extraordinary cases of interrupted distribution yet discovered.

The above notice of Mr. Ferriss is taken, with minor changes, from an obituary written by Prof. Willard N. Clute for the Third Report of the Joliet Park District. To the Commissioners of that District and to Prof. Clute we are indebted for permission to use it, and to the latter also for providing the photograph reproduced herewith. Other notices of Mr. Ferriss have appeared in the *Nautilus* for July, 1926, and in the *American Botanist* for April, 1926.—Ed.

Observations on the Woolly Lipfern

EDGAR T. WHERRY

In the Spring of 1925 Dr. John K. Small organized a trip through the south-central states, in preparation for his forthcoming flora of that region, and the writer went along to aid in collecting ecological data. We traveled by automobile, and received mail at various points along the way. On arriving in Austin, Texas, one evening in mid-April, I was glad to find among my forwarded correspondence a letter from Mr. Weatherby, in which were included the following remarks:

"Will your trip south take you where *Cheilanthes tomentosa* is found? The other day, in looking over some old letters of G. E. Davenport's which have come in to the Gray Herbarium, I ran across the statement by one of his correspondents, Mrs. Kate Barnes, of Syracuse, that the young growth of a plant of that species which she had under cultivation was not circinate, as usual in ferns, but merely folded back as in the *Ophioglossaceae*. In all probability Mrs. Barnes's statement was based either on an error in observation or on the anomalous behavior of an individual plant under greenhouse conditions; nevertheless, it might be worth while to see if the young fronds of *C. tomentosa* under natural environment show any perceptible difference in manner of development from ferns in general. And I suppose this would be the time of year to do it."

Although we had already been in the field for several weeks, no Woolly Lipfern had as yet been encountered; but by a remarkable and fortunate coincidence, the very next day after the receipt of the letter we came upon a large colony of it. The locality was an abandoned quarry at Baringer Hill, about 6½ kilometers (4 miles) southwest of Bluffton, on the west bank of the Colorado River in Llano County, Texas. The rock is of granitic char-

acter, and the quarry was operated some years ago for rare-earth minerals which occur in coarse pegmatitic phases of the granite. The fern has become colonized in crevices in the walls, and its soil-reaction proved to be minimacid, specific acidity 2 to 5. No other ferns appeared to be present, although gravelly weathered surfaces of the rock supported *Selaginella riddellii* Van Eseltine; its soil reaction was high minimacid, specific acidity 5 to 8.

Had it not been for the previous receipt of Mr. Weatherby's letter, I would not have made special note of the young growth; but the time of year was, as he had supposed, exactly right, for young fronds in all stages of development were present. Mrs. Barnes's observation proved to apply not only to cultivated plants, but to refer to what appears to be a peculiarity of this, and perhaps other xerophytic species: not one of the young fronds was circinate, or rolled into a fiddle-head, but all were merely doubled back against the stipe, like a bent finger. Specimens were accordingly sent to Mr. Weatherby, and he has prepared the notes upon them making up the article following this one.

Later in the Spring another find of *Cheilanthes tomentosa* was made which seems worth placing on record. The northernmost locality for it thus far reported is Peters's Gap, Grant County, West Virginia, where it was noted by A. B. Brooks[1] "on the rocks of a high cliff" (presumably of sandstone). In June, 1925, a single small plant of it was found on the north bank of the Shenandoah River south of Riverside School, 6½ km. (4 mi.) southeast of Charles Town, Jefferson County, W. Va. It grew on a bare shale ledge, near the top of a

[1] Millspaugh, C. F. The living flora of West Virginia, p. 192, 1913.

slight cliff, facing south and fully exposed to the sun. Its relative, the Hairy Lipfern (*C. lanosa*), was abundant in the vicinity, but in more sheltered places where it could obtain a little more moisture. The soil reaction proved to be low subacid, specific acidity 20 to 30. About half the tiny clump was collected and deposited in the U. S. National Herbarium to establish this hundred kilometer extension of range.

As efforts are likely to be made to bring this attractive species into cultivation in rock-gardens,[2] attention should be called to the fact that in every colony thus far examined its soil reaction is more or less acid, the optimum being about specific acidity 5. Calcareous rocks and soils should therefore be excluded from the bed in which it is to be grown.

WASHINGTON, D. C.

Imperfectly circinate Vernation in Ferns

C. A. WEATHERBY

In the very young bud of all species of ferns in which this feature has been investigated, the blade is not circinate, but is folded back along the stipe somewhat after the fashion of *Botrychium lanceolatum*. Coiling develops later, from inequality of the rates of growth of opposite sides of the rachis; it is, at least in our northeastern ferns, perfected before the young shoot appears above ground, and persists at the tips of blade and pinnae until they are nearly fully expanded.

Dr. Wherry's specimens of *Cheilanthes tomentosa* show no proper circination at any stage of growth, but

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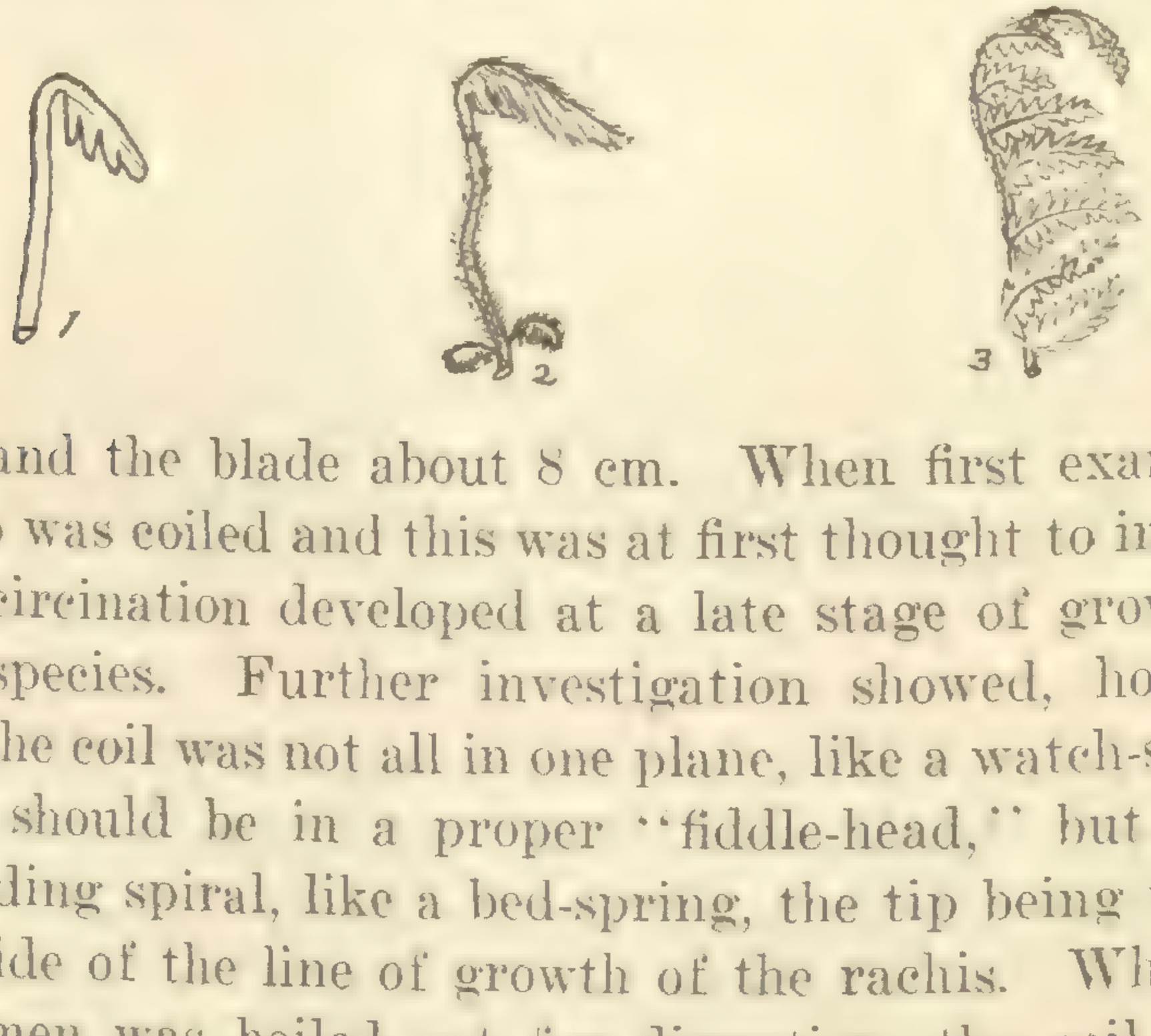
[2] It is for sale by Bridwell Brothers, Forestburg, Texas, and possibly other dealers.

appear to retain the original posture of the blades throughout. Fig. 1 is a diagrammatic sketch, magnified three times, of a very young frond, with stipe 5 mm. long and blade 3 mm., from which the hairy covering has been removed. Fig. 2 represents, one-half natural size, the upper part of a frond in which the stipe was fully developed, 10 cm. long, and the blade just beginning to expand, the lowest pinnae appearing left behind by the rapid growth of the rachis. Fig. 3 shows, also half life-size, the characteristic position of the tips of nearly expanded fronds. This particular one had the stipe 7 cm.



long and the blade about 8 cm. When first examined, its tip was coiled and this was at first thought to indicate that circination developed at a late stage of growth in this species. Further investigation showed, however, that the coil was not all in one plane, like a watch-spring, as it should be in a proper "fiddle-head," but in an ascending spiral, like a bed-spring, the tip being well to one side of the line of growth of the rachis. When the specimen was boiled out for dissection, the coil disappeared, and the tip assumed the position in the drawing —which is also that of the other fronds in Dr. Wherry's material at a similar stage of development. When again dried, without pressure, the tip returned to its spiral.

No such phenomenon occurs when the pressed crozier of a fully circinate fern (*e.g.*, *Cystopteris fragilis*) is boiled out. The coil remains just as it was. It would seem, therefore, that the coiling in the above case was merely the ordinary curling up of the fronds of xero-

phytic ferns under conditions of drought, the drying, in this one instance, having been done under insufficient pressure to prevent it.

Herbarium specimens show beyond reasonable doubt that the closely related *Cheilanthes Eatoni* has a vernation similar to that of *C. tomentosa,* and they indicate that the same is true of other southwestern species of the group. Furthermore, Prof. F. O. Bower has very kindly called my attention to the fact that in *Pteris cretica* likewise the young blades are only bent back, not coiled, and are so illustrated in Engler & Prantl's *Natürliche Pflanzenfamilien,* I, pt. 4, p. 291; and he thinks there are other similar cases. As he points out, coiling depends on so slight and temporary a difference of rates of growth that it hardly can be expected to be constant in all ferns. The statements in some of the works on morphology and classification of plants that vernation in ferns is "generally" or "usually" circinate allows, of course, for such known exceptions as that of *Pteris cretica*; but, rather surprisingly, very little notice appears to have been taken of them. These notes on hitherto unrecorded American instances have, therefore, seemed worth publishing.

What the cause of these departures from the common habit of ferns may be is not easily made out. There can hardly be any environmental influence common to *Pteris cretica,* a plant of moist, shaded situations, and the xerophytic American *Cheilanthes.* It may possibly be of significance that the examples so far known to me are all in the subtribes *Pteridinae* and *Cheilanthinae* of Diels's classification; this suggests that their non-circinate vernation is an inherent and inherited quality of certain groups—a true taxonomic character, not a response to environment.

EAST HARTFORD, CONN.

The Ferns of Barro Colorado Island—I[1]

PAUL C. STANDLEY

Barro Colorado Island in Gatún Lake, the central and most elevated portion of the Panama Canal, was set aside April 17, 1923, by the Governor of the Canal Zone as a permanent reservation for the animal and plant life of the region. It is the largest of the numerous artificial islands in Gatún Lake, covering approximately six square miles, and being about three miles in diameter, with a very irregular shore line of nearly 25 miles.

Before water was turned into the Canal, this area formed a part of the hills bordering the Chagres River. It is now separated from the mainland on one side by only a narrow channel (one of the French diversion canals); on the other side stretches the wide expanse of the lake, along whose farther shore runs the railroad that traverses the Isthmus and connects the cities of Colón and Panama. The topography is irregular. There are numerous hills, often with steep sides and separated by gullies or ravines through which flow small clear streams. The highest point is 537 feet above sea level, and 450 feet above the average level of Gatún Lake. The name Barro Colorado signifies "red clay," and, considering the nature of the soil, it is a highly appropriate name.

Most of the island is covered with a dense forest, altogether typical of the lowlands of the Atlantic slope of Central America. Probably it is not a truly virgin forest, since there can be little land close to the Canal from which trees have not been cut at one time or another; but in a region so favorable for plant growth openings made by clearing, if not too extensive, are invaded

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[1] Published by permission of the Secretary of the Smithsonian Institution.

quickly by new vegetation. Over most of the island the forest at least simulates a virgin growth, and the abundance of palms and tree ferns indicates that it has been little changed from its original condition, for these are plants that disappear once the forest covering is removed, and apparently they never reestablish themselves on a completely denuded area.

Toward the upper end of the island are a few clearings, occupied formerly by native settlers who tilled small patches of ground. Now that cultivation has been abandoned, these openings, covered at present with rank weeds and shrubs, will soon be invaded by forest.

I visited Barro Colorado first on January 17, 1924. There was then only a small frame shack near the shore, scarcely big enough to shelter one person for a night. A single meandering trail had been cut, leading nowhere in particular, and it was so overgrown that it could be followed only by constant consultation of a vague written description that we carried with us. Following this inadequate trail, however, the charm of the locality and the richness of its vegetation were immediately apparent. There is certainly no region in this part of Panama which has a more varied or interesting flora. I collected on this day about 300 plants, taking everything that seemed determinable, since it was desired to obtain as complete as possible a record of the flora.

When I visited the island again, in November, 1925, spending a week there as the guest of the laboratory, the changes wrought during the two years were astonishing. Landing at the same spot, we found now a large clearing, extending well up a steep hill, at the top of which there has been constructed a spacious laboratory. A flight of seemingly endless steps leads to the building, running alongside a tramway used for hoisting baggage and other articles to the top of the hill.

The laboratory is a substantial frame building of two floors, screened throughout. The ground story has a concrete floor, and is used as a dining hall and for storage space and rough work. On the second floor there is ample laboratory space on the wide veranda, besides bedrooms, a drying room, and closets. Small outbuildings provide a kitchen, storehouses, and laborers' quarters.

The laboratory is an almost ideal working place, secluded from the distractions of the towns of the Canal Zone, yet within easy reach of them. The jungle and the primeval forest are at the door. Sanitary conditions, of prime importance in the tropics, are excellent, and every provision is made for the welfare and complete comfort of investigators. The climate is agreeable, rather hot in the daytime, it is true, but never so bad as in the hottest summer of the eastern United States, and the nights are comfortably cool. Everything is so agreeable that one has every incentive for loafing in a hammock, and watching from the laboratory windows the ever-changing panorama of the world's ships passing through the main channel of the Canal, only a few hundred yards away.

The designation of this island as a reservation, and the construction of a laboratory for use of those who wish to study at first hand the natural history of the tropical forest, is the result of the interest and labor of Dr. Thomas Barbour and Mr. James Zetek, the latter the resident custodian. Contributions have been made by other persons and by several educational institutions, but these two deserve the greater part of the credit for providing for scientists these splendid research facilities. The administration of the laboratory is entrusted to the Institute for Tropical Research, under the direction of the National Research Council. A caretaker and a cook live at the laboratory, and serious-minded visitors are welcomed.

To those who have worked so hard to establish this institution it is a great satisfaction to know that their efforts have been appreciated by the considerable number of scientists who have spent weeks or even months here, carrying on varied investigations. There is already a substantial bibliography of papers reporting the results of the researches and visits of those interested in natural history. Most of the investigators have been zoologists, but among the botanists have been Prof. C. W. Dodge, of Harvard University, and Prof. G. R. Bisby, of the Manitoba Agricultural College, both of whom studied fungi, and several others who have visited the island for a single day.

This list of ferns is based upon collections made by Dr. William R. Maxon on June 6, 1923, and upon those made by myself. During the week spent upon Barro Colorado in November, 1925, only about 500 numbers of plants were collected, for I did not attempt to gather the most common plants, with which the National Herbarium is already well supplied from the Canal Zone, merely making notes of these, and taking specimens only of those plants that seemed of interest or were not readily determinable in the field. After study of the assembled collections, nearly 600 species of plants may now be listed from the island, a number that will be increased when the area has been adequately explored. From the whole region of the Canal Zone about 2,000 species of flowering plants are known, but many of these are confined to the Pacific slope and are not to be expected on Barro Colorado.

There are now several miles of trails radiating in all directions over the island, and by following these one may form a good idea of what tropical forest is really like. One has here the virgin vegetation on either hand,

A Characteristic View from the Vicinity of the Barro Colorado Laboratory, looking toward Gatun Lake. The Dead Trunks of Trees killed when the Land was inundated are a conspicuous Feature of the Lake.

(Courtesy of the Journal of Heredity)

within easy reach, without the necessity of cutting a way into it.

Many of the trees are true giants, with limbs far above the ground, so far, in fact, that usually it is difficult to guess their identity. As is generally the case in the lowlands, many of the heavy trunks are braced by rigid bracket-like buttresses, while other trees, like the stilt palms (*Iriartea*) and guarumos (*Cecropia*), are supported by stout prop-roots, like those of maize.

The branches of the trees are loaded with epiphytes, especially aroids, orchids, bromeliads, and ferns, and the trunks also are festooned with these plants and surrounded by the dangling stems of innumerable woody vines. There is a luxuriant undergrowth of shrubs and coarse herbs, among which palms, a few tree ferns, and Heliconias are conspicuous. The vegetation, as a rule, is not so dense as to obstruct the view in the immediate vicinity, but often it is so interlaced that passage through it is possible only with the aid of a machete.

The density of the vegetation is in large part the result of heavy rainfall, about 130 inches per year, twice as much as at the Pacific end of the Canal only a few miles away. Moreover, here on the Atlantic slope there is some rain almost throughout the year. Although during the wettest months there is an average of about an inch a day, this does not hinder work seriously. The rain falls in a few showers of short duration, the water runs off quickly, and even if one is soaked while following the trail the sensation is rather agreeable, on account of the high temperature.

A morning's trip along one of these trails is always likely to furnish some new object of interest aside from the plants. There are several hundred species of birds, among which those most certain to attract attention are the parrots and parrakeets, and the clumsy toucans with

their huge beaks that so strongly suggest a banana. One is certain to hear the curious gurgling notes of the oropéndolas, large black and yellow, oriole-like birds that hang their long pendent nests in colonies from the tall trees.

Mammals are exceptionally plentiful, and freedom from molestation has made them tame. Droves of peccaries are not easily seen, but one may hear them rooting in the ground, see the bushes moving where they are at work, and catch the strong odor that reveals their near presence. Flocks of white-faced monkeys leap through the treetops in apparently reckless disregard of their lives, and other kinds of monkeys may be seen or heard occasionally. Jaguars and some other cats have been observed on the island, and in the mud have been found the tracks of tapirs, the largest Central American mammals. Smaller animals may be seen frequently, particularly the coatis or pizotes, relatives of the raccoon. A tame coati kept as a pet at the laboratory last year was a never-failing source of amusement, and possessed intelligence quite equal to that of any dog. Two tame deer also provided entertainment for visitors.

Insects give little annoyance in the Canal Zone. Ants are always a pest in Central America, and must be taken for granted. Their variety is infinite, and it would be difficult to find a square foot of ground free from them. Snakes do exist here, some of them poisonous, but they need occasion no great uneasiness, except that one should employ reasonable care and keep one's eyes open.

In the lowlands one does not find the most interesting ferns of Central America, nor usually the most interesting plants of other groups. The greatest development of ferns takes place in the mountains at 4,000 feet and higher, where the atmosphere is cool as well as moist. In such a place the abundance of ferns, as to both species

and individuals, is bewildering, and there are probably few places in the world with a richer fern flora than the mountains of Costa Rica, for instance.

All the region of the Canal Zone belongs to what is sometimes called the Lower Tropical life zone, in which over large areas the vegetation is rather uniform as to species, with due allowance for variations in local environment. In the Canal Zone the vegetation is more varied because we have here both the Atlantic and Pacific slopes of the continent, the former wet, the latter dry, each with a more or less distinct flora.

Barro Colorado Island lies within the humid division of the Lower Tropical zone. The vegetation that covers the whole island is strikingly uniform in its general aspect, but really it is highly diversified. The only interruption to the apparent uniformity of this forest vegetation, which is typical of the *tierra caliente* of Panama, are the stream beds, the clearings already mentioned, and the aquatic or semiaquatic plant societies of the shores.

The ferns and fern allies are, of course, nearly all confined to the forest. They are divided between terrestrial and epiphytic species, the former being in the majority as to species and individuals. The number known from the island is unexpectedly large, considering the fact that the fern flora of the Canal Zone is small. One soon notes that ferns, chiefly of a few species, form a rather conspicuous element of the undergrowth. This is especially true of *Cyclopeltis* and the Tectarias, the large species of *Dryopteris* and *Diplazium*, and a few characteristic Adiantums. It may not be stated that from a systematic standpoint the ferns occurring here are exceptionally interesting—indeed, the flora would seem decidedly commonplace in Costa Rica; but the ferns growing on Barro Colorado are typical species of the Atlantic coast of Cen-

tral America, and as such they deserve study. Certainly they will interest any visitor from the States who is unfamiliar with tropical vegetation.

WASHINGTON, D. C.

(To be continued)

Recent Fern Literature

Among the rarities which attract most observers of ferns are the various abnormalities which occur in species of Botrychium—and this is as it should be, since these "freaks" are not only striking in themselves, but may be of unexpected significance. It should therefore be of more than usual interest to our readers to find an article by Prof. M. A. Chrysler, long a student of the morphology of the grape-ferns, in which these seemingly strange forms are discussed in detail and classified. Prof. Chrysler has examined numerous specimens in a number of herbaria, in addition to such fresh ones as were available. He recognizes among them three main classes of abnormal variants: 1, branching or duplication of the fertile segment; 2, occurrence of sporangia on pinnae ordinarily sterile; 3, more or less complete sterilization of the fertile panicle.

1. Probably most of us have regarded division or duplication of the fertile segment as the same phenomenon in all cases; but Prof. Chrysler finds more than that in it. He distinguishes three types, one due to splitting (*i.e.*, an abnormal and accidental division of the growing tip of the young branch, such as occurs in forking forms of ferns), one to the wide separation of ordinary branches, and one to reversion to or toward an ancestral condition. The first two classes he has observed only in

Botrychium virginianum. In the first, due to splitting, there are only two fertile panicles; one branch is smaller than the other; the branching, though it may occur anywhere, is likely to be high up on the fertile stalk; and dissection shows that the smaller branch takes parts of both the vascular bundles which supply the fertile segment, whereas a normal branch would take its supply from one only. To the second kind of forking, due to the wide separation of ordinary lower branches, belong the specimens of *B. virginianum* with three or more fertile panicles. In them, branching usually occurs near the base of the fertile stalk and, at least in my single specimen of the kind, the branches start from the main stalk at a wide angle and then, within a centimeter or less, bend rather abruptly upward. This condition Prof. Chrysler interprets as cases in which the basal branches of the panicle arise at a much lower point than usual; he has apparently not had opportunity to investigate their vascular system. Of course, such an interpretation assumes a very vigorous development of the distant branches; the fertile panicles which they bear are often nearly or quite as large as the primary one.

Additional fertile panicles in the group of *B. ternatum* belong in quite a different category—reversion. In all species of Botrychium the fertile segment is supplied with two vascular bundles, which branch from the common stalk in precisely the same manner as do the pair of bundles which supply any two adjacent pinnae on opposite sides of the sterile segment, one to each pinna. From this and other evidence, most morphologists who have considered the matter believe that the fertile segment represents two lower pinnae which have grown together and become entirely fused, and that cases in which two fertile segments are produced are reversions to an ancestral condition before fusion had taken place. The extra

fertile segments in the *ternatum* group are variously arranged; Prof. Chrysler distinguishes five groups as follows: (1) the fertile segment forking halfway up its stalk; (2) a pair of fertile panicles of equal development arising right and left at the same level; (3) a pair of fertile segments as in (2) with an additional one higher up; (4) a normal fertile segment and an additional one higher up; (5) a normal segment and a pair of smaller ones further up. So far, the vascular supply has been investigated only in group (1); in it, one strand goes to each branch.

I have a specimen, from Salisbury, Conn., which superficially seems to show a sixth arrangement. It has three fertile panicles which appear to arise from nearly the same point; unfortunately, it is so pressed that their relation cannot be exactly made out and it may be merely a case of class (3) or class (5) with the common stalk much shortened.

When there are more than two fertile panicles in this group, it would seem necessary to regard the extra ones as additional fertile pinnae, either single or two fused.

2. The occurrence of sporangia on pinnae ordinarily sterile is, so far as the writer's observation goes, a comparatively frequent phenomenon in the smaller Botrychia and a comparatively rare one in the groups of *B. ternatum* and *B. virginianum*. When it does occur in these latter groups, however, it may do a very thorough job. Prof. Chrysler has illustrated a specimen of *B. obliquum* in which the apical third of the sterile segment is wholly fertile; and I have a specimen, presumably of the same species, collected at South Windsor, Conn., by Mr. C. W. Vibert, which has no sterile segment at all, and no indication that one has been broken off. Instead, it has two well-developed fruiting panicles, one of them unequally branched rather high up on its stalk, with the smaller

division, except for its high point of origin, in the same (posterior) position as that ordinarily occupied by the sterile segment and appearing to have taken its place.

3. Sterilization of the fertile segment also seems to be rare in Botrychium; but Prof. Chrysler records cases in *B. neglectum* (*B. ramosum*), *B. silaifolium* (*B. ternatum*, var. *intermedium*), and *B. obliquum*.

The significance of the phenomena in classes 2 and 3 would seem to be merely the illustration of the rather ready interchangeability of the fertile and sterile condition in the fronds of these and other dimorphic ferns.

It is evident from all this that there is more to be found out concerning abnormalities in Botrychium and that they offer a wider field for observation than most of us have, probably, supposed. Prof. Chrysler, whose address is Rutgers University, New Brunswick, N. J., would no doubt be glad to receive specimens of any of the forms enumerated above, so that he may carry further his investigation of their vascular systems. Fresh specimens are preferable for dissection; but well pressed ones can be used, and a pressed specimen in good condition is vastly better than a once fresh one which arrives hopelessly withered or decayed.[1]—C. A. W.

A scientific survey of the possessions of the United States in the West Indies—Porto Rico and the Virgin Islands—is in course of publication by the New York Academy of Sciences. It includes, of course, a flora: the treatment of the fernworts in this flora is by Dr. Maxon and has been reprinted in a separate, and handy, pamphlet. As was to be expected, it gives a careful, thorough and expert handling of current systematic knowledge of the pteridophyta of the region. There are excellent keys

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[1] Chrysler, M. A. Abnormalities in Botrychium and certain other ferns. Bull. Torr. Bot. Club **53**: 279–288, pl. 9. May, 1926.

to families, genera, and species, detailed descriptions of each species, synonymy, and statements of ranges outside of the territory covered by the flora. In the matter of "splitting" species, Dr. Maxon is wisely conservative, especially in critical groups which have not received recent monographic study. The work is not only a valuable contribution to science; though it is, of course, not a "popular" treatise in the sense of avoiding technical terms and being deliberately written down to an elementary level, it should be also a welcome companion to fern lovers who may visit the islands. It may be purchased from the Secretary of the New York Academy of Sciences, 77th St. and Central Park West, New York City, for $2.00.[1]

FERNS OF CORNWALL, CONNECTICUT.—*Polypodium virginianum*, f. *cambricoides* (so far as east-American specimens are concerned, the same plant as that called in the fern-books, *P. vulgare*, var. *cambricum*; see this JOURNAL **14**: 6 and 60, 1924) is a rarity which anyone may well be pleased to find. One of the first reported stations for it in the northeastern states is that found by the late Prof. Underwood in Cornwall, Conn. A letter from our member, Mrs. E. M. Foote, who spends her summers in that town, gives interesting particulars of the present status of this fern there.

"I had heard," she writes, "that Prof. Underwood found the var. *cambricum* of the *Polypodium vulgare* on Mohawk Mt., four or five miles from here, some twenty years ago, so I was on the lookout for it for many years. About five years ago a man who knew *nothing* of ferns came to me and pulling a small, wet newspaper package out of his pocket, said: 'Here—you like ferns—what's

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[1] Maxon, W. R. Pteridophyta; in Scientific Survey of Porto Rico and the Virgin Islands, Vol. 6, Part 3. New York, 1926.

this?' And, behold, a crushed little bunch of the (to me) rare cambricum! Most unfortunately the man and his wife had pulled almost all they found up by the roots to fill two ferneries. The spot where they found it is about eight or ten miles from Mohawk Mt. and about four from us, so I have been over to watch its struggle for life every year. This year (1925) only three fronds remain—they have not been picked, for we have placed an old log where it will hide them and no one else knows about them.''

Fortunately, specimens of Prof. Underwood's collecting are at the New York Botanical Garden, the Gray Herbarium and very likely elsewhere.

Mrs. Foote adds a list of Cornwall ferns, which is printed below. Those marked with an asterisk have been found on her farm. Twenty-five species of true ferns and six grape ferns from a single farm is a record which may be rejoiced in, even though it does not equal those of some of the especially favored spots described in the JOURNAL some years ago (**9**: 106, 1919; **10**: 57, 60, 91, 1920).

1. *Adiantum pedatum**
2. *Asplenium platyneuron**
3. " ***acrostichoides****
4. " ***Trichomanes***
5. *Athyrium Filix-femina**
6. *Botrychium dissectum**
7. " ***lanceolatum****
8. " *neglectum**
9. " ***obliquum****
10. " *simplex**
11. " ***tenebrosum****
12. " *virginianum**
13. *Camptosorus rhizophyllus*
14. *Dennstaedtia punctilobula**
15. *Dryopteris Boottii*
16. *Dryopteris Clintoniana**
17. " *cristata**
18. " ***intermedia****
19. " ***marginalis****
20. " *noveboracensis**
21. " *spinulosa**
22. " ***Thelypteris****
23. *Filix bulbifera**
24. " ***fragilis****
25. *Matteuccia Struthiopteris**
26. ***Onoclea sensibilis****
27. *Osmunda Claytoniana**
28. " *cinnamomea**
29. " *regalis**
30. *Phegopteris Dryopteris**

Abnormal Forms of Botrychium Simplex

31. *Phegopteris hexagonoptera**
32. " ***Phegopteris****
33. *Polypodium vulgare**
34. " " , var. *cambricum*
35. *Polystichum acrostichoides**
36. ***Pteris aquilina****
37. *Woodsia obtusa**
38. " ***ilvensis***

The Botrychia were for the most part identified by Miss Slosson at the New York Botanical Garden.

SOME ABNORMAL FORMS OF BOTRYCHIUM SIMPLEX.—At North Pomfret, Vermont, where I have spent my vacations for a number of years, I found this summer (1926) these queer, freaky little plants of *Botrychium simplex* E. Hitchc.

Two of them were growing among the grass, near the edge of a little shelf, very near the top of a shaded ledge on a steep hillside. At the other end of the ledge, near the foot, was a little group of *B. simplex*, but there were no freaks among these plants. *B. virginianum* (L.) Sw. and *B. ramosum* (Roth) Aschers. were quite plentiful there.

At another station fully two miles distant, on a shady roadside, I found the third little freak, growing with *B. ramosum*, *B. simplex*, and *B. simplex*, var. *compositum* (Lasch) Milde.—AMEY E. LILLIBRIDGE, *Providence, R. I.*

Miss Lillibridge's specimens, here illustrated through her kindness in contributing the cost of the plate, are of especial interest in connection with Prof. Chrysler's article reviewed in this issue of the JOURNAL. Figures 1 and 2 represent a type of variation different from any described by him in that both the fertile and sterile segments are duplicated, producing something very like two normal plants on the same stalk. One of the three fertile segments in no. 2 appears clearly to have taken the place of a single lobe of the sterile segment; the other two

occupy their normal position or are near it. Figure 3 represents, seemingly, a distorted individual of *B. simplex,* var. *compositum* in which an additional fruiting panicle has been developed just below the point of branching of the three-parted sterile segment. The irregular form of this segment may be due to injury. —C. A. W.

American Fern Society

A FIELD MEETING WITH DR. W. S. MONROE.—Turning from the main road at North Duxbury on to the hill road, one immediately feels the spell of nature's most lavish bestowments. A shady fern-bordered, flower-bordered, rock and brook-bordered, shadow-strewn road lures us on. Traffic fears leave us, giving place to peaceful expectancy and interest; and we might wish that time for us had no limit and such a road no end but that it leads to Dr. Monroe's hospitality—hospitality unsurpassed unless by that of Scottie, the doctor's Scotch Collie.

Here at the foot of Couching Lion, on the highest farm in the state, were spent three delightful days—from July 3rd until July 5th. The principal hike was the climb to the top of Couching Lion—this was accomplished by a few, the rest stopping on the Sky-line Trail, at Montclair Glen Lodge, a camp built by Dr. Monroe—a hike of five miles.

Thirty-five species and varieties of ferns were observed. Dr. Pringle's station for *Woodsia glabella* was rediscovered and a new station for *Aspidium fragrans* found, the fresh fragrant fronds of which were enjoyed for the first time, by most of us. Interesting specimens of the form of the cinnamon fern, in which the same

frond is partly sterile and partly fertile, were collected. The total attendance at this meeting was about twenty, of whom fifteen were members of the Society.—MAUDE L. CHISHOLM.

Dr. William E. Safford, a member of the Society since 1901, died at Washington, January 10, 1926. He was born at Chillicothe, Ohio, in 1859 and graduated from the United States Naval Academy in 1880. He saw active service during the Spanish-American War, and in 1899 and 1900 was vice-governor of the Island of Guam. In 1902 he joined the scientific staff of the U. S. Department of Agriculture, with which he has since remained.

Dr. Safford's professional work with the Department was concerned principally with forage plants, but his active intellect reached out to many other interests, chief among which were probably botany, marine zoology, ethnology, and linguistics. He utilized for observations the voyages on which his duties as a naval officer took him; readers of the early volumes of the FERN JOURNAL will recall his charming "Notes of a Naturalist Afloat"—which, incidentally, contain some interesting autobiographical matter. His sojourn in Guam produced authoritative works on the useful plants and the Chamorro language of the island; and he was the author of numerous other scientific papers of high quality.

Anne Sibley Angell, daughter of John Wilmarth and Elizabeth Herman (Stillwell) Angell, was born in Providence, R. I., April 13, 1855. Her education was in the Providence High School and in Wellesley College, although she did not graduate from the latter institution.

She had a very active mind and a tenacious memory, was a great reader and a lover of art, music and nature. Early in life she became interested in botany, an interest

that was stimulated by an intimate acquaintance with William Whitman Bailey, then an amateur botanist and later Professor of Botany in Brown University. She once catalogued and extensively added to an herbarium in Butler Asylum, Providence, R. I.

Her active mind suffered at times from overstrain and she was obliged to rest and recuperate in quiet places. Most of the latter half of her life was passed in Brattleboro, Vt., where she delighted in the beauties of the river and the hills. She died December 29th, 1925. She had been a member of the American Fern Society for more than twenty-two years.

Mr. John F. Young, of Ithaca, Judge of Elections, reports under date of November 9: "Up to date I have received 98 ballots, all voting for the candidates as nominated and all in favor of electing Professor Bower as an Honorary Member." The officers for the ensuing year, 1927, will therefore be:—*President*, Dr. Wm. R. Maxon; *Vice-President*, Mrs. Carlotta C. Hall; *Treasurer*, Mr. Jay G. Underwood; *Secretary*, Rev. Charles S. Lewis.

New members:

Bates, Miss Amy L., Park Museum, Providence, R. I.
Carpenter, Dana S., Middletown Springs, Vt.
Cromwell, Miss Mary L., 198 Flax Hill Road, South Norwalk, Conn.
Dole, W. Herbert, 23 Overlook Ave., West Orange, N. J.
Dunn, Miss Jennie E., Sherbrooke Road, Searsdale, N. Y.
Fay, Mrs. Dudley Ward (Aimie B.), 63 South St., Albany, N. Y.
Gordon, Miss Sue L., Livermore, Maine.
Hewitt, Mrs. Judith D., 308 West 82nd St., New York City.
Kelton, Mrs. George H. (Ruth C.), Hubbardston, Mass.
Lawton, Miss Elva, Dept. of Botany, Univ. of Michigan, Ann Arbor, Mich.
Nice, Mrs. Margaret M., Norman, Okla.
Petzke, Ernest A., M.D., Hixton, Wis.

Platt, Miss Caroline M., 944 Park Ave., New York City.
Pugsley, Frank M., Pittsford, Vt.
Sadler, Miss Nellie M., 429 Westcott St., Syracuse, N. Y.
Sawyer, Mrs. N. T., 15 South Lyons Ave., Menanda, Albany, N. Y.
Taylor, William Gavin, 267 Belleville Ave., Bloomfield, N. J.
Wilson, Cyril M., 111 North Dunn St., Bloomington, Ind.
Wright, S. Fred, 52 South Jefferson St., Orange, N. J.

Changes of address:

Carhart, Macy, 1246 Boston Ave., Pasadena, Cal.
Fisher, George L., 610 Hadley Ave., Houston, Texas.
Holtzoff, Mrs. Mary, 163 West 128th St., New York City.
Kamm, Mrs. Oliver, 571 Washington Road, Grosse Pointe, Mich.
Kimber, Miss N. B., 538 Locust Ave., Germantown, Philadelphia, Pa.
Leeds, Arthur N., 5321 Baynton St., Germantown, Philadelphia, Pa.
Lewis, Rev. William Fisher, Jeffers, Mont.
Mackenzie, Kenneth K., 615 Prospect St., Maplewood, N. J.
Noyes, Miss Elmira Elsie, 912 Brandon Ave., Norfolk, Va.
Willis, Warren J., 2482 89th Ave., Queens Village, N. Y.
Winkler, P. A., Box 91A, R. D. No. 1, Beaumont, Texas.
Wright, Miss Mary F., Ambler, Pa.

The Fern Society could and should have a membership of 500 or 600 for there are a great many who are already interested in ferns, knowing and growing them, yet are not affiliated. Let's have a general drive by all members during the first six months of 1927—"booster months" if you please—presenting the advantages of, and giving pressing invitations to join our Fern Society. As a little extra inducement, each new member may be promised two freshly pressed, fully mature hart's tongue fronds, averaging 15 inches or better in length, to the first 75 new members. After that number, equally good sized ones could be sent, though collected some seasons ago. The choice fronds were collected very late this season and it is very doubtful that as good ones will ever again be available from this section. All members sending in new

names with dues will be given an 8 x 10 "shadow print" of freak hart's tongue, made by using an actual pressed specimen in place of a negative, of some of the more remarkable forms collected.

My own interest in ferns dates from the day a friend showed me an article in a magazine stating that the hart's tongues grew less than ten miles from where I lived, and mentioning how rare they were. On a holiday not long afterward, with a teacher from the local military school, with our "bikes" of those good old days (this was 30 years ago), I went a few miles by train and then coasted down the beautiful winding valley road to the vicinity of the station, which was soon located. Of course we were thoroughly thrilled and I have had many glorious days and experiences through the years since, visiting, studying and collecting hart's tongue in its haunts. W. R. Maxon says (*National Geographic Magazine*, May, 1925, page 562): "With me the hart's tongue will always hold first place, for it was the boyhood gift of two fronds of this remarkable plant that first excited my interest in ferns and sent me scurrying over the limestone hills of central New York to the picturesque gorge of Chittenango Creek where it grew. The thrill of discovery, of handling, and possessing the thick glossy fronds so unlike those of any other native fern, the eerie quiet of the chasm itself, the odor of crushed Herb Robert, all seem as vivid now as many years ago."

The fern has a peculiar appeal generally and, offered in this way, should be an introduction and a clincher in securing new members. Besides, won't you enjoy your own membership twice as much, if you secure others?—H. E. RANSIER, *Manlius, N. Y.*

Certainly we second Mr. Ransier's motion; and we hardly know how to express adequately our appreciation of his hard and generous work for the Society.

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ERRATA

Page 12, last line: for *B. regalis*, read *O. regalis*.
Page 57, line 1: for *Selaginella*, read *Salvinia*.
Page 81, line 2 of foot-note: for 167, read 176.
Page 95, line 13: for *antennarifolius*, read *antennariifolius*.

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AMERICAN FERN SOCIETY

EDITORS

R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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American Fern Journal

VOL. 17 JANUARY-MARCH, 1927 No. 1

Ferns of Barro Colorado Island--II

PAUL C. STANDLEY

The following list enumerates all the ferns and fern allies known at present from Barro Colorado Island. The determinations have been made by Dr. Maxon.

MARATTIACEAE

DANAEA NODOSA (L.) J. E. Sm. A common coarse terrestrial fern, usually a meter high and sometimes as much as 2 meters; leaves simply pinnate, the pinnae opposite, subentire, arising from swollen nodes.

SCHIZAEACEAE

LYGODIUM POLYMORPHUM (Cav.) H. B. K. One of the most abundant ferns of Central America, especially of the Pacific slope; a slender hairy vine, very different in general appearance from the climbing fern of the United States, often forming dense tangles in dry thickets. On Barro Colorado it occurs only in recently cleared places.

LYGODIUM RADIATUM Prantl. A handsome plant with very large pinnae, climbing on shrubs and small trees; a forest species, confined to Panama and adjacent parts of Colombia.

[Volume 16, No. 4 of the JOURNAL, pages 103–136, plates 9–11, was issued February 2, 1927, not January 14, as stated in the table of contents of Vol. 16.]

CYATHEACEAE

HEMITELIA PETIOLATA Hook. The tree fern family is represented on the island, apparently, only by this species, which is a very handsome plant, with a tall slender trunk and a crown of numerous graceful leaves. It is common in the forest, especially in gullies, and there are many strikingly beautiful individuals. Known only from Panama.

POLYPODIACEAE

ACROSTICHUM. A species was noted as rather common in shallow water in the edge of Gatún Lake, but specimens were not collected. It may be either *A. aureum* L. or *A. daneaefolium* Langsd. & Fisch.; both are common species of the region. In some localities about the Canal Zone the *Acrostichums* form a conspicuous part of the rank vegetation of the tidal swamps.

ADIANTUM LUCIDUM Swartz. One of the common ferns of the region, growing chiefly in deep forest; a rather unattractive member of the genus, as are many of the Central American species. Probably none of them is so graceful as our maidenhair of the North. This species ranges well into South America.

ADIANTUM PHILIPPENSE L. Rather frequent about the Canal Zone, but it does not appear to be very plentiful in Central America generally. It seems to prefer rather dryish situations. Easily recognized by its narrow, once pinnate leaves, with pale green, thin pinnae. The species extends to the East Indies, its specific name indicating one of the regions in which it grows.

ADIANTUM sp. A species not yet determined and probably not described; it is frequent in Panama and extends northward in Central America along the Atlantic lowlands.

ANANTHACORUS ANGUSTIFOLIUS (Swartz) Underw. & Maxon. A common epiphytic fern, widely distributed in tropical America. It was referred formerly to the genus *Vittaria*, whose species it resembles in habit, although the leaves are wider than those of the *Vittaria* growing here.

ANETIUM CITRIFOLIUM (L.) Splitg. A frequent but unattractive plant, with sessile, broadly oblanceolate, acute, entire leaves, which, in spite of being rather thick, usually hang limp like flannel. It is an epiphyte, frequenting usually palm stems or other smooth trunks.

ASPLENIUM SERRATUM L. This is the American bird's-nest fern, simulating *Asplenium nidus* of the Old World. The broad thick simple leaves form great hollow basket-like clusters on the branches of high trees. The thick felted roots form a large mass that holds the plant firmly in place.

CYCLOPELTIS SEMICORDATA (Swartz) J. Sm. Perhaps the most abundant fern of the Canal Zone, often forming dense stands through the forest. It is a conspicuous and handsome plant, with tall, erect, once pinnate leaves having numerous narrow pinnae. There is an ample supply of the plant on Barro Colorado. This species is abundant in the West Indies and Central America generally, but the four other species of the genus are East Indian.

DICTYOXIPHIUM PANAMENSE Hook. Of rather infrequent occurrence here, on wet clay banks. A coarse plant with simple erect swordlike leaves; ranging northward to Guatemala.

DIPLAZIUM DELITESCENS Maxon. This might dispute with *Cyclopeltis* the claim for place as the commonest fern of the Canal Zone. It does not form dense stands as does that fern, but it is present nearly everywhere if not too crowded by other vegetation. The plant resembles a middle-sized *Asplenium*.

DIPLAZIUM GRANDIFOLIUM Swartz. A much larger plant than the preceding species, strikingly beautiful because of the contrast afforded by the blackish stipe and rachis, pale under surface of the leaves, and dark brown sori with unusually ample indusia. It is frequent here in the dense forest.

DRYOPTERIS DENTATA (Forsk.) C. Chr. A common and rather handsome fern of the dense forest, of that general type represented in tropical America by so many closely related species that are difficult of separation. This species is widely dispersed in tropical America, and occurs in several parts of the Old World.

DRYOPTERIS POITEANA (Bory) Urban. A characteristic plant of wet clay soil in the forests; confined to the lowlands, where it is often abundant in half cleared land or in banana plantations, especially along the banks of small streams. In aspect it is distinct from most species of *Dryopteris*, being once pinnate, with few narrow, subentire or coarsely crenate, soft-hairy pinnae.

ELAPHOGLOSSUM HERMINIERI (Bory & Fée) Moore. An infrequent but conspicuous epiphyte, with dimorphous leaves. The sterile fronds, which are narrow, simple, and entire, when fresh are leathery and hang limp from the branch on which the plant is perched; they are sometimes a meter long. When dried, a condition difficult to attain since they will remain indefinitely in the press, giving up their moisture with the utmost difficulty, they are stiff and hard as a board.

ESCHATOGRAMME FURCATA (L.) Trev. A widely distributed epiphyte of the lowlands, but not occurring here in great abundance; often growing on small saplings. The forking leaves, with entire divisions, are of a peculiar deep shade of green.

LEPTOCHILUS CLADORRHIZANS (Spreng.) Maxon. Very common in wet clay soil; one of the most abundant forest

ferns of Central America, but of little beauty. The thin fronds are pinnatifid into few long narrow segments. The tips of the leaves are often much elongate, and very frequently they take root, thus forming new plants. Until recently this species has been confused with *L. alienus*.

NEPHROLEPIS PENDULA (Raddi) J. Sm. Common upon tree trunks, and forming great masses about them, the graceful narrow fronds several feet long and hanging loosely. A relative of our well known Boston fern. Widely distributed in continental tropical America.

PITYROGRAMMA CALOMELAENA (L.) Link. One of the most frequent and widely distributed of tropical American ferns, recognizable immediately by its bipinnate leaves, with acute segments and white powdery under surface, the fronds turning bronze at maturity. A rather weedy plant, usually found in exposed places, particularly on steep clay banks; frequently thriving by roadsides or on cut-over land.

POLYBOTRYA OSMUNDACEA Humb. & Bonpl. A showy forest fern. It begins life upon the ground, but the ropelike rhizomes soon run up tree trunks, often to a considerable height, producing numerous large leaves, the fertile ones much dissected.

POLYBOTRYA CAUDATA Kunze. Similar in habit to the last, but with coarse bipinnate blades.

POLYPODIUM CILIATUM Willd. A slender plant with tiny entire fronds and filiform wide-creeping rootstocks, adhering to tree trunks. It is typical of a group of the genus represented in tropical America by numerous species of little beauty.

POLYPODIUM CRASSIFOLIUM L. A coarse epiphyte, growing on trunks or high branches, the long stiff entire leaves bearing huge wartlike sori. Abundant throughout the American tropics.

POLYPODIUM OCCULTUM Christ. A species of the section *Campyloneuron*, known outside of Panama only from Costa Rica, growing always at low elevations.

POLYPODIUM PECTINATUM L. One of the forms of this aggregate species. An epiphyte; leaves of a dark green, with very numerous, closely spaced, long, narrow segments.

POLYPODIUM PERCUSSUM Cav. A common epiphyte, with small, lanceolate, long-tapering, smooth and rather lustrous leaves, which are scaly-punctate beneath and have embossed sori. An ubiquitous plant throughout most of tropical continental America.

SACCOLOMA ELEGANS Kaulf. A handsome terrestrial fern, of exceptionally neat appearance; leaves pinnate, the sori in close-set shallow marginal pockets.

STENOCHLAENA VESTITA (Fourn.) Underw. One of the most common ferns here. Rhizomes stout and cord-like, covered densely with scales, creeping high on tree trunks and emitting numerous leaves, these dimorphous, with many narrow spreading pinnae. It ranges northward through the Atlantic lowlands of Central America.

TECTARIA **euryloba** (Christ) Maxon, n. comb. (*Aspidium eurylobum* Christ.) Frequent here; a coarse plant with leaves 1 to 2 meters long. The fronds are very deeply pinnatifid, the rachis winged throughout, the segments few and broad, bearing numerous small dotlike sori. Described originally from Costa Rica.

TECTARIA MARTINICENSIS (Spreng.) Copel. One of the most abundant ferns of the Canal Zone forests, preferring a good supply of moisture; often a weedy plant, and able to persist in partly denuded areas. A very variable species, with large, coarse, variously pinnatifid leaves, densely hairy or nearly glabrous, and bearing large round dark-colored sori. General in tropical America.

VITTARIA LINEATA (L.) J. E. Sm. Common; growing in small or large clumps on the trunks and branches of trees, or even on saplings, and almost suggesting a grass in its appearance. The extremely narrow leaves are numerous, somewhat fleshy, with inrolled margins; sometimes they are laxly pendent and as much as three or four feet long.

HYMENOPHYLLACEAE

TRICHOMANES GODMANI Hook. Frequent on tree trunks; a small epiphyte with filiform rootstocks, and delicate leaves which require a humid atmosphere to prevent withering; fronds rounded and subentire, minute.

TRICHOMANES KRAUSII Hook. & Grev. Growing on trunks in rather dense mats, the leaves 1 to 2.5 cm. broad and deeply lobed. Widespread in the West Indies, and less abundant on the continent; growing usually in the lowlands and on the foothills.

TRICHOMANES SPHENOIDES Kunze. Common, forming loose mats; similar in appearance to *T. Godmani*, the leaves mostly 5 to 10 mm. broad. In the Greater Antilles, and extending from Panama southward into South America; also in southern Florida.

SALVINIACEAE

SALVINIA AURICULATA Aubl. Floating on quiet water of small inlets about the edge of the island; growing with white waterlilies (*Nymphaea*), *Utricularia*, and other aquatic plants. It is not infrequent about the Canal Zone.

LYCOPODIACEAE

LYCOPODIUM CERNUUM L. Reported by Prof. C. W. Dodge as collected here. This species, so widely dis-

tributed in the tropics of both hemispheres, is rarely abundant in Central America, and is scarce about the Canal Zone. It is a terrestrial species, the main branches erect, branched, and treelike, the cones recurved.

SELAGINELLACEAE

SELAGINELLA CONDUPLICATA Spreng. The most common Selaginella of the region, abundant in wet forests; a handsome erect plant, with long spreading runners. The Selaginellas are conspicuous nearly everywhere in the humid forests of the Canal Zone. They are all terrestrial. Although they form a large and difficult group in Central America, many of the species are so well marked that one quickly learns to distinguish them in the field.

SELAGINELLA FENDLERI Baker. A pale green, prostrate plant, growing in wet places. A species based upon specimens collected by August Fendler, one of the first botanists to collect seriously in the region of the Canal Zone (in 1851).

SELAGINELLA HAEMATODES (Kunze) Spring. One of the most easily recognized species, distinguished by its dark red stems; a particularly beautiful plant, with erect stems and dense, bright green, frondose foliage.

SELAGINELLA SCHRAMMII Hieron. A widespread but apparently rare plant of the Atlantic slope, described first from Nicaragua; delicate, ascending, with dark green leaves.

SELAGINELLA SYLVATICA Baker. In moist forest; stems running over the ground, very brittle, with laxly ascending lateral branches.

WASHINGTON, D. C.

A Caribbean Cruise and some Jamaican Wayside Ferns—I

F. E. Corne

Some years ago I read somewhere a sentence to this effect: "on one shaded hillside in Jamaica are to be found from five to six hundred varieties of ferns." I noticed it particularly because just about that time it seemed the fashion to call any place in New England where 35 to 40 varieties had their habitat a "fern paradise." If 40 make a paradise what superlative name could be used for a place where more than twelve times that number were to be found? So when last winter (1925–26) it was arranged that my sister and I should go for a southern cruise, stopping over for a few weeks in Jamaica, that statement was called to mind with many pleasant anticipations, and more than once I found myself in imagination wandering over that shady hillside gathering rare ferns galore—and, of course, all of a convenient size to be preserved in my press.

To be sure, the island of Jamaica is 144 miles long and from 20 to 40 wide and where that particular hillside was to be found I had no means of knowing. But as 470 species are officially attributed to Jamaica, I was certain to find some spot almost equally attractive. What then was my dismay when a friend who has lived many years in the island said, "Oh, but you can't go fern hunting in Jamaica; you must not think of such a thing." "Why?" I asked. "Snakes, poisonous reptiles, or what?" "Oh no, nothing of that kind, but *ticks*—innumerable ticks." —Well, I had heard of ticks—unpleasant things, but one can be on the lookout for them, and, anyway, what would a little discomfort matter compared to a collection of rare ferns?

On the Columbian Cruise, which we had chosen, the ship stops twice at Jamaica, its first and last port of call, the first time to leave freight, the second to take on bananas and other fruit. On the fifth morning out from New York the blue mountains of the island came into view, lovely in the early morning light, misty with blue and purple shadows, rising out of a sapphire sea. Soon we entered the beautiful harbor of Kingston, and as the mountains receded the water became of a deeper blue. Presently our attention was called from the landscape to watch an approaching rowboat out of which tumbled half a dozen boys shouting to the passengers to throw pennies into the water for them to dive for—just as they do in the bay of Naples, only there, the boys being white of skin, their descent into the depths could easily be watched, while these black boys seemed to disappear almost as soon as the water covered them.

Arrived at the dock, we found automobiles waiting to take us up to Castleton Garden, twenty miles distant, and the show horticultural garden of the island. The drive to it is said to be one of the most beautiful in Jamaica. As the mountain road, with many a turn, ascends to a height of 456 feet one catches, over the tops of intervening trees, frequent glimpses of blue mountain peaks and fertile valleys below, with frequent running streams crossed by rustic bridges, and here and there a cultivated field with a native hut looking too tiny to be actually the home of human beings.

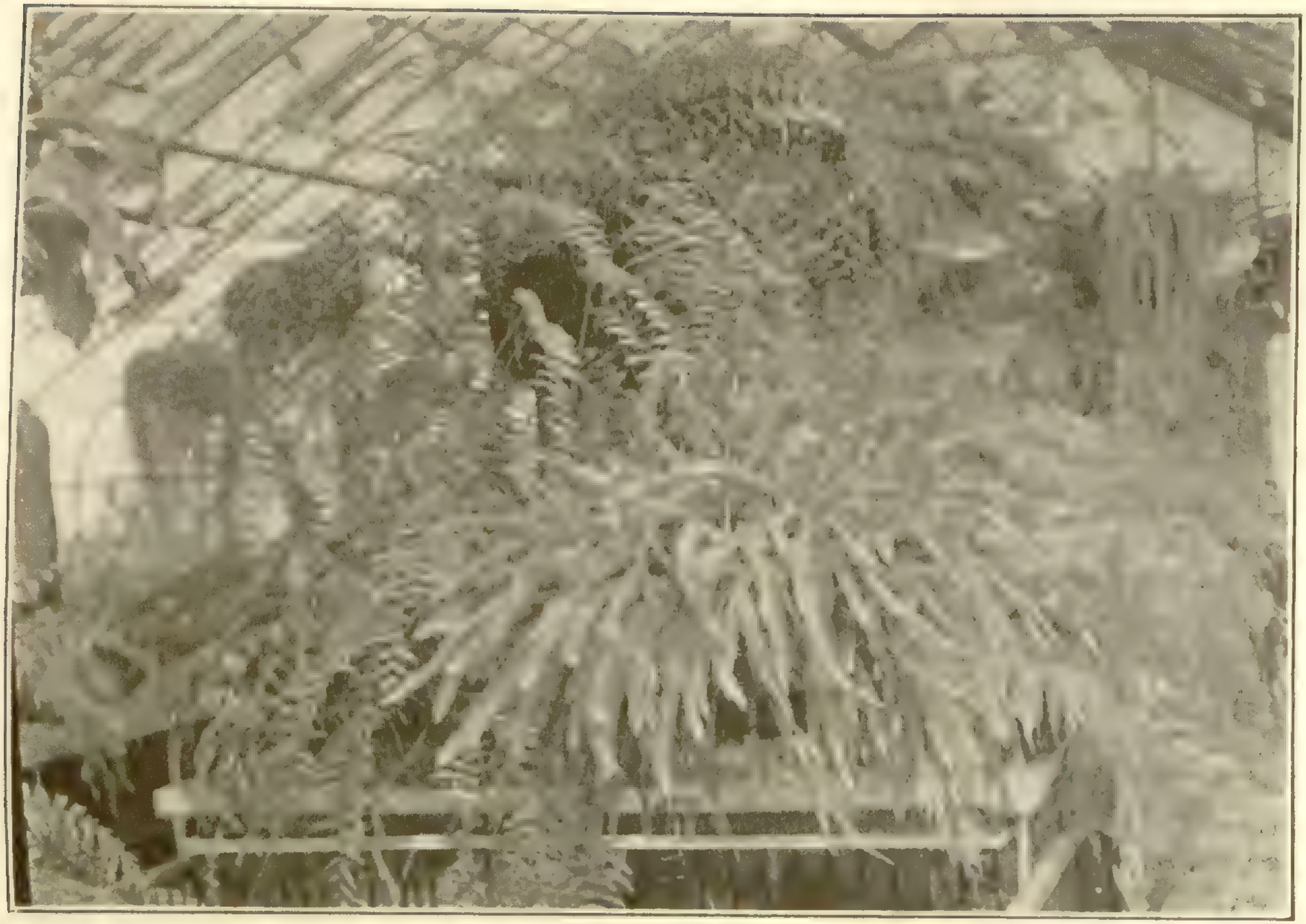
All the way up, perhaps on account of long drouth, I saw but one fern, a polypody growing out of a cleft in a rock, and on it I had designs for the return trip.

Arrived at the garden, we were besieged by girls to buy chains made of many-colored seeds tastefully strung, while boys offered vases made out of prettily carved sections of bamboo, "to hold our flowers," they said. An

old gardener was waiting to guide us about, pointing out various tropical trees and shrubs—camphor, cork, mahogany, bread-fruit, traveller's palm, etc.—and finally brought us to a lovely little lake surrounded by ferns, palms, and other tropical plants. On its surface floated the huge leaves and one lovely blossom of the *Victoria regia*. On a nearby tree, eight or ten feet from the ground, grew a fine plant of *Nephrolepis exaltata*. Growing in the grass I found two ferns which the gardener allowed me to pick, and which proved to be *Nephrolepis pectinata* and *Blechnum occidentale*—also fronds from a fallen tree fern, *Cyathea arborea*. Seeing that I was particularly interested in the ferns he went into a thicket and brought me a frond of a large-leaved maidenhair—*Adiantum latifolium*—and also one of the peacock Selaginella, a shimmer of blue over the green of its leaves. In a nearby hut some girls were busy making Jippa Jappa hats (pronounced Yippa Yappa) which closely resemble the Panama, but are made of a native straw.

We longed to explore further this lovely storehouse of plants, mainly shrubs and trees from all over the tropics, but time pressed. Wind and tide had been against us the preceding night and early morning, so that we had landed some hours behind time, and now we must hasten or lose the appetizing lunch, at which we were to sample our first tropical fruits, prepared for us at the Myrtle Bank, one of two hotels owned by the United Fruit Company, excellent, also very expensive. We were rushed down the precipitous hillside at such a rate that I gave up all thought of the polypody and was thankful that our chauffeur remembered to sound his horn before reaching each of the many sharp turns in the road.

Again on the ship, some one had brought to friends a large bunch of flowers, and among them fronds of the



A Greenhouse Plant of Nephrolepis pectinata—that with Narrow Fronds, in the Foreground.

(Photograph by the Brooklyn Botanic Garden)

graceful silver fern—*Pityrogramma tartarea*—several of which were given to me. My press being still packed, I placed them between newspapers, using my mattress for a not very satisfactory weight.

Our next stop was at Cristobal, the American port of the Canal Zone. From here we motored to Gatun, where we watched a large oil ship pass through the lock at a cost of $7,000. Then we went by rail to Panama, passing the largest artificial lake in the world, were motored all over the clean new city to the officers' quarters, saw the Culebra Cut, had a glimpse of the Pacific Ocean, and passed through the old city. From Cristobal we sailed along the northern coast of South America, stopping at the ancient town of Cartagena, then at Puerto Colombia, and finally at Santa Marta, where we remained two days while 36,000 bunches of bananas were taken on board. These filled three long trains of cars and took a gang of about twenty men more than fifteen hours to bring to the receiving bags, or conveyors, which, working on endless chains, carried them to the ship's hold. Meanwhile, the first afternoon, we motored to Barronquilla, called the "Mt. Vernon of South America," the very simple home of Simon Bolivar, the inside walls of which were fairly covered with wreaths of artificial flowers placed there in memory of the great liberator. Everywhere I was on the lookout for ferns, but there had been no rain for several months and our trips took us usually over paved streets or dusty highways, and not a fern was to be seen.

On the second day we went by rail to Rio Frio, 17 miles inland, to visit a banana plantation. The odd little cars were furnished with movable wicker chairs. For some miles the road skirted the many-tinted waters of the Caribbean Sea, while on the left, in the near distance, towered the mountains of the Sierra Nevada de

Santa Marta range, wonderfully beautiful in hazy tints of pink and blue, violet and purple. We passed through plantations of cocoanuts, bananas, and pineapples, by adobe cottages painted in bright colors—green, yellow, blue, or red—and streams where women were washing clothes while little chocolate-colored naked babies played about. Once we passed a field with cacti as tall and straight as trees, and sometimes had a tantalizing glimpse of some tall ferns growing in stream or swamp. It was hard to realize that not many years ago this fertile plain was a denge jungle so poisonous that even the inland natives were afraid to approach it.

Arrived at the plantation, several of the men of our party were supplied with spirited ponies and the rest of us were seated on chairs placed on the top of ox-carts, and thus in state drove through miles of banana groves. Before starting, however, our animal, frightened by the horses, bolted, and but for two men catching the heavy chain attached to his nose ring, we should probably have been landed, a motley heap, in a nearby ditch.

At the side of one of the many irrigating ditches I saw a delicate looking fern about fourteen inches high, but it was impossible to get it. We were roped in, and our charioteer, trudging stolidly on in front, understood no English—and I could not speak Spanish. So I resolved to return for it. But this, to my amazement and amusement, our young guide sternly forbade—but modified his command by saying that there were some ferns by the brook in the garden which I could gather. He was right, of course; it was over 90 in the shade and the distance uncertain. So down to the garden I went, where, sure enough, I found several plants apparently the same as the one seen on the way out. But how to get them! They grew on the farther side of a swiftly flowing little stream—the Rio Frio, of unknown depth—crossed

by a single narrow plank, with no hand rail. Probably I could get across safely; but if not—well, a plunge bath would be very refreshing that warm day, but scarcely convenient. However, Mr. Roberts, the first officer, who was in charge of the day's outing, hearing of my dilemma, came and quickly running across the plank, gathered the fern—but was so badly stung by some nettle or insect that it necessitated a call on the ship's doctor, and for the rest of the cruise his bandaged hand was a constant reminder of his kindness and the sting which I had escaped. The fern was *Dryopteris tetragona.*

(To be continued)

Botrychium dissectum in Iowa

E. W. GRAVES

Since coming to Iowa six years ago I have searched various localities in Van Buren and Jefferson Counties, hoping I should find *Botrychium obliquum.* I hardly expected to find *B. dissectum,* but I did think that in sandy soil along the Des Moines River or some of the creek bottoms I might locate a few plants of the former. The soil in southeastern Iowa is of a clayey texture with very little sand except along the rivers and creeks.

I went out one day in August to get a clump of *Polystichum acrostichoides* for my fern garden, and while exploring a ravine I came to a large sandstone boulder some 200 ft. long by 30 or 40 ft. high completely blocking the ravine. The water had fallen over one end of the rock wall, cutting a small channel. Another watercourse came around the other end of the rock, keeping close to the bottom until it joined the other channel, when both flowed on together.

Ages ago the top edge of the boulder had evidently crumbled off and, being mixed with decaying vegetation, had made a perfect Botrychium soil. On this sort of elevated knoll, under the trees on the north side of the sandstone wall, were very few weeds or grasses growing, but patches of moss covered the ground in places. While standing looking toward the ground I saw what appeared to be a small Botrychium. I examined more closely and found it to be a small *B. dissectum*. Glancing a little farther I saw another, then another, then a few feet farther, in a bed of moss, I saw seven fairly large plants, one having a fruiting spike. Then down on my knees I went and searched the ground for a rod or more. Whenever I found a plant, I stuck a stake by it. After searching for a considerable distance, spending an hour at it, I came back and counted 27 plants, large and small. The next day I came back and found four more small ones. Some were so small they had only two or three lobes, but every plant had dissected pinnules, showing that they were true *B. dissectum*. In my searches I expected to find at least one plant of *B. obliquum*, but none were found. In a few days I came back and searched all likely places for half a mile around, hoping to fine more, but I was unsuccessful in locating any others.

Dr. L. H. Pammel, Professor of Botany at the Ames Agricultural College and Chairman of the Board of Conservation, was in the County a week later and I invited him to come and see the colony of *B. dissectum* I had found. He was very much interested in this find, and he told me he believed it was the first time it had been found in Iowa. He suggested that we procure a small plot of land around it as a reserve for the state, so that it could be protected. I have made an enclosure of brush around it to keep the stock from destroying it. One of the largest plants, one having a fruiting spike, had been

cropped off by some animal, but the animal had dropped the leaves on the ground and I took the parts and pressed them.

I wrote Prof. B. Shimek at the State University at Iowa City, asking him if the herbarium at the university contained any specimens of either *B. obliquum* or *B. dissectum* and if either had been found in the state before. He wrote me that there was just one specimen of *B. obliquum* which he had found at Cedar Rapids. It seems that this was the first time that *B. obliquum* had been found and my colony of *B. dissectum* is the first of that fern for the state. I have examined several books and pamphlets on the plant life of Iowa and I find no record of *B. dissectum* and only one of *B. obliquum* being found in Iowa. Prof. Fitzpatrick in his list of the ferns of Iowa mentions *B. obliquum*, but perhaps he had reference to the plant Prof. Shimek had found. I wrote Prof. Fitzpatrick about it, but up to the present I have received no reply.

All the 31 plants in my colony were inside a plot 10 ft. by 6 ft. There were all sizes from small plants of two lobes up to plants four inches across. Only two of the thirty-one had fertile spikes. One with a fertile spike had been cropped off, but at this writing it has sent up another sterile frond. I counted 16 plants of *Botrychium virginianum* growing not over 30 ft. from this plot where *B. dissectum* grew. On the rock wall and in the soil near were plants of *Polystichum acrostichoides*, *Woodsia obtusa*, *Filix fragilis*, *Adiantum pedatum*, and *Athyrium Filix-femina*.

This is not the first time *B. dissectum* has been found growing by itself. In Vol. 13, No. 2 of the JOURNAL, Mr. O. A. Farwell records finding a colony of *B. dissectum* growing alone near Detroit, Mich. He states that there are no plants of *obliquum* growing near this colony.

I am of the opinion that fern students will yet have to admit that *B. dissectum* is a valid species, and not a sterile mutant as some in the past have thought. If 31 plants of *dissectum* came here from spores cast by *obliquum*, where is the plant that cast the spores? Cedar Rapids, the only place in the state where *obliquum* has been found, is about 100 miles from here. It appears to me that there is a difference in the range of these two plants. Both are fairly common in the northeastern states. *Obliquum* alone is found in the southeast, as I have shown in my paper in the JOURNAL, Vol. 13, No. 3. I know of no record of *B. dissectum* being found south of the 36th parallel. In the ten years I have spent in Alabama I have failed to find a single plant of *B. dissectum*. *B. obliquum* ranges south to the Gulf of Mexico. I have found it common throughout Alabama. It is reported from Mississippi, Georgia, and Florida. West of the Mississippi both seem to be rare. Neither has been reported from Arkansas, Missouri, or Minnesota. Only one station for each has been found in Iowa. To the north of our border, *obliquum* has been reported by Klugh in his list of ferns of Ontario. But Jennings in his list for Northwest Ontario fails to mention it. In Quebec, Mr. Henry Mousley reports both as abundant, but states that they are restricted to only one locality in the province.

BENTONSPORT, IOWA

Is the Distribution and Naturalization of the Hart's Tongue Scientifically Defensible?

R. C. BENEDICT

The title of this discussion was suggested by a point which has been raised regarding a possible objection to the wide-spread distribution of hart's tongue plants as carried on by Mr. Ransier and myself during the last year or two. Writing to Dr. Campbell E. Waters last September on another matter, I asked if he did not want some small hart's tongue plants for naturalization near Washington. I quote from his reply:

"Thank you for your offer of plants of Scolopendrium, but I think you need not send me any of them. As far as I know there are no outcrops of limestone around here, though plenty in the Baltimore region. Another reason, if you can forgive me for saying it, is that I long ago came to the conclusion that it is a bad practice to upset our successors by introducing plants in a region far outside their natural range. In 1902 I had a lot of plants of *Polystichum Braunii*, and put some of them in selected spots. Later when my botanical conscience got to work after somebody had expressed the same opinion as that in the preceding sentence, I went the rounds to remove all of the introduced plants. Not one could be found—so I felt better."

My own opinion in partial dissent was expressed in a letter as follows: "I was interested in your letter. I own to be in entire agreement as to the undesirability of introducing most plants to alien regions, as for example, the practices of the 'seed scatterers' who throw seed of many cultivated varieties of garden plants everywhere throughout the country. I am not anxious to see petunias and geraniums, etc., distributed along country roads.

"Perhaps I am deeply in error in principle with respect to the hart's tongue distribution, but I can see the thing from several angles on which I could base some defense. However, not to write at length, I hope you can forgive me if I ask that the conservation of the hart's tongue be considered the exception to the generally desirable rule."

A further letter from Dr. Waters developed the discussion as follows:

"I am willing to accept your plea that any measures that will save the hart's tongue are justifiable, and I even urge you to distribute it to all whom you think able to keep it alive. However, as a general thing, I feel sure that our native plants ought not to be introduced outside their natural ranges. It may upset later students of plant distribution.

"Take two examples. *Asplenium parvulum* is said to grow in Virginia within sight of the Capitol, and *Polypodium polypodioides* grows on the Maryland side of the Potomac near Great Falls. If I had introduced these ferns near Baltimore, only forty miles away, a later collector might with good reason believe that this new locality was at the extreme of their range.

"In my own opinion this would be worse than introducing species so far out of their range that anybody else who finds them will almost certainly know that they were planted there. I found the ostrich fern twelve miles north of Baltimore in 1894 and a few years later found it as many miles west of the city. In the meantime it was found along the Potomac. In all these places it grows in alluvial soil close to a river which has tributaries that come from Pennsylvania. Nature did the transplanting, and we have nothing to say. There would be something to say about plants found in southern Virginia, because they would obviously be too far from

where they belong. That would have been the case if my *Polystichum Braunii* had lived."

To meet any possible objection such as suggested by Dr. Waters's letter and as a matter of record, there is appended to this series of quotations a list of the persons and localities to whom the fern plants have been sent. If any names have been inadvertently left out of either list, will such people be good enough to advise us of the oversight, so that the records may be entirely complete?

In some cases the plants sent were to be set out in fern beds and gardens so that for these the question of possible naturalization is not likely to arise. However, practically all the young spore plants from the Brooklyn Botanic Garden were distributed with the definite proviso that naturalization was to be tried. For these the list of localities will have special pertinence.

It will be a matter of continued interest to have the condition of any of the distributed plants reported from time to time. The condition after winter of the young sporelings set out in the wild, whether the new crop of leaves surpasses the 1926 crop in size and number, the first appearance of fertile leaves—these and other points are matters regarding which Mr. Ransier and I will be glad to hear.

At the Brooklyn Botanic Garden a considerable number of last year's crop of sporelings, which were too small for last summer's distribution, have since progressed considerably in size. These will be available about next May. A few of them are showing a tendency to cresting or forking of the leaf tips. A new crop has been started from fresh spores collected during 1926 by Dr. John B. Todd, but they will hardly be ready before another year.

Distribution of Hart's Tongue ferns from near Jamesville, New York, by H. E. Ransier. These were taken up to avoid their destruction by quarrying operations.

Barnes, Mrs. A. C., Merion, Pa.
Benedict, J. E., Jr., 945 Pennsylvania Ave., Washington, D. C.
Bill, Mrs. G. E., 819 Third St., Harrisburg, Pa.
Braun, Miss E. Lucy, 2702 May St., Cincinnati, Ohio.
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Distribution of young Hart's Tongue ferns raised from spores at the Brooklyn Botanic Garden. The spores were collected near Jamesville, New York.

Mr. W. H. Aldridge, 23 Storm St., Tarrytown, N. Y.
Prof. C. E. Allen, Department of Botany, University of Wisconsin, Madison, Wis.
Prof. H. R. Baker, University of Delaware, Newark, Delaware.
Mr. Maurice Brooks, French Creek, West Virginia.
Mrs. Dudley Ward Fay, 63 South St., Auburn, N. Y.
Miss Esther Fletcher, 231 Douglas Ave., Kalamazoo, Mich.
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BROOKLYN, N. Y.

ATHYRIUM WARDII IN NORTH AMERICA?—In a recently issued paper by Á. Kiss and J. B. Kümmerle: *Pteridophytes from East Siberia*, Ann. Mus. Nat. Hungarici. **24**: 1926, I find on page 90 the following entry:

"*Athyrium Wardii* (Hook.) Mak. ssp. *major* (Mak.) Kümm. comb. nov. . . . British Columbia: Selkirk 3.

VIII. 1905 (leg. Charles H. Shaw sub *Aspidio cyclosoro* nr. 1069). Filix novo pro America septentrionalis!'' *A. Wardii* is a wide-spread East-Asiatic species (Japan, Corea, China, perhaps extending to Yunnan) ; the variety *major* is Japanese, described by Makino in Bot. Mag. Tokyo 1899, p. 28, 79. The occurrence of this species in Pacific North America is of great interest, and therefore I call the attention of the members of this society to Prof. Kümmerle's statement. I do not know whether his identification is right or the locality correct, but perhaps some members have specimens from Shaw's collection and can give information as to these points.—CARL CHRISTENSEN, *Copenhagen.*

THE HART'S-TONGUE IN A GARDEN.—In recent numbers of the FERN JOURNAL there have been so many notes about the hart's-tongue that perhaps an account of it as a garden plant will not be unacceptable. Those who took advantage of the offer of plants by Dr. Benedict in No. 4 for 1925 may be glad to know how a plant has been kept alive and flourishing in my garden for about ten years.

The plant was sent to me with three or four other species, and though having a feeling that it should not have been removed from its native habitat I knew that was no reason for letting it die without a struggle. So it was planted in the spot that seemed most likely to be suitable for it. The back boundary of my lot is a chicken-wire fence with a twelve-inch plank running along next to the ground. The fence runs nearly east and west. On the south side of it a stone wall has been erected and the earth banked up to the top, so that the soil close to the fence is not only partly shaded, but it is always damp, and often quite wet, because of the ground water from behind the wall. The fern was planted in the angle

formed by the bottom plank and a cedar post. As it is on the east side of the post it gets the early morning sun during the summer and no dense shade until the afternoon sun goes behind the trees to the west.

There it thrives with no special care. In the fall some leaves are packed around it, and perhaps again in the spring if the first have been blown away. Once or twice a year a moderate handful of hydrated lime is sprinkled around it. That is all. At this writing, September 22, the plant has about forty fronds of all sizes up to about ten inches long. Some fifteen of them are fertile, a few with immature sori and the others with ripe spores. The fronds are not as large as they were the first few years, perhaps because they are rather crowded, for the plant has four or five crowns.—C. E. WATERS, *Washington, D. C.*

CLIMBING FERN IN A GARDEN.—One of our editors asked for a note about my climbing fern for the "JOURNAL." What is there to say except that I planted it and it lived? Yes, it not only lived; it thrived and spread until now, after eight years, it covers an area nearly two yards square.

When it first began to spread, I moved cardinal flower and everything else to give it plenty of room, but now I let it shift for itself and it is gradually taking possession of that end of the garden.

The Virginia chain fern is getting out of the way as fast as it can, which is at the rate of four or five inches a year. Both that and the Lygodium are outside the garden in one place.

The clayey soil is yellowish and must be sour or Lygodium would not thrive in it. From time to time I have sifted a little loam from the vegetable garden over the surface. There is not much moisture, although being

below the drive and alongside a stone retaining wall, the ground does not dry out so fast as it would otherwise.

Just now, Sept., 1926, a mass of twining fern covers cardinal flowers, gentians, and other plants, the tendrils of fertile leaves reaching well up on the stalks of tall Turk's-cap lilies. It is the prize exhibit of all my ferns. —RACHEL L. LOWE, *Portland, Maine.*

THE "MASSACHUSETTS FERN" IN WEST VIRGINIA.—I would like to report the discovery near French Creek, West Virginia, of a fine colony of *Thelypteris simulata* (so pronounced by Dr. Wherry). Millspaugh reports collecting specimens that corresponded with the description of this fern in West Virginia a good many years ago, but so far as I know there have been no other records.—MAURICE BROOKS, *French Creek, W. Va.*

EBONY SPLEENWORT IN A WELL.—Another fern which can survive in the limited light of wells besides those described by Mrs. Lombard in the last number of the FERN JOURNAL is *Asplenium platyneuron*. I have found it growing at arm's length over the edge of an old boarded-up well near Oyster Bay, Long Island. The well was so old that half the boards had rotted away, but still the plants were so small that they resembled *Asplenium trichomanes* in size. *A. platyneuron* was very abundant in the immediate neighborhood.—MINNIE WATSON KAMM, *Detroit, Michigan.*

Another Vermont Station for the Male Fern.—I am glad to report a new station in Vermont for *Aspidium Filix-mas* —if a single plant may be said to constitute a station. The fern is growing in the edge of a field on our farm in East Calais, not over three rods from the house and must be several years old, though it was not until late this summer that it was discovered. We are about twenty miles north from Paine Mountain, Northfield, the nearest known station, and the altitude is not far from 1,250 feet.

Thirty-two species of ferns are found in this vicinity, including Braun's holly, Goldie's, rusty woodsia, crested shield, fragile and bulblet bladder, and the silvery, maidenhair, and ebony spleenworts. It is interesting to conjecture how this plant of *Filix-mas* came to be growing here, apparently so far from its fellows. We are brought face to face with the essential mystery of all plant life.—Sylvia H. Bliss, *East Calais, Vermont.*

The Uninterrupted Life of an Interrupted Fern. —They were not far from the house, across a couple of fields, on a little knoll which was partly encircled by a lusty trout stream, flowing from large springs at the base of the wooded hill close by. The knoll was out in the open, except for a most beautiful large tulip tree whose lower branches were so low that one could pick flowers from them while standing on the ground. Some shrubs and berry bushes shared the space, but these first interrupted ferns were especially tall and the sterile fronds more graceful than any discovered since; in fact, I know of no others within many miles of these.

Of course they were frequently visited, admired and photographed. They were "mine." My first shock was to find the tulip tree cut down. The owner, though a good friend, was not long in discovering my sentiments!

A visit a season or two later in early spring revealed the land cleared, plowed and dragged. Surveying the field, almost dumb, my eyes rested upon several long dark objects on the surface of the dragged soil, the longest perhaps six feet or more in length and 3 or 4 inches in diameter, resembling the ladies' one time "boa" at a distance. They were the remains of the root-stems of my interrupted ferns! Closer inspection revealed that the boa consisted of the stipes of unnumbered seasons' growth of fronds, only a few inches of the tip ends being still alive. These tips were rescued, and planted in a place of honor on the east side of the house and are still there, though some 20 years have rolled by since the transplanting.

I have often wondered since how old those root-stems were and have had it in mind this season to dig up some wild specimen for examination, but the opportunity did not come.

However, I have examined one by the house and knowing about how long they had been there, estimate that they extend about an inch each year normally, so there is reason to believe that originally I had evidence in my hand of their being 75 years old, and no doubt earlier parts had decayed away or broken off when plowed up—100 years continuous growth beyond doubt. I still marvel that such a length of root-stem should have held together during the preparation of the soil for planting.—H. E. RANSIER, *Manlius, N. Y.*

Have you had any specially interesting experiences with the Interrupted Fern, *Osmunda Claytoniana*? It sometimes happens that regarding the commonest species of plants one may discover items of unusual interest. For example, I never see a common plantain nowadays without recalling Professor Fernald's account of its early

Indian name of "Englishman's Foot" and with that name the associated facts regarding its introduction in this country in connection with the foot wear of the early settlers.

Clayton's fern has always had a special attraction for me both because of early associations—I had read about it for some time before I found my first plant, and had therefore been looking for it for some time—and because of its very satisfactory behavior in the fern garden. Do JOURNAL readers agree that for an ordinary back-yard garden without specially prepared soil, it is probably the most adaptable of all our common ferns? Its leaves develop symmetrically even when poorly nourished, but it responds readily to good feeding. It maintains itself in good appearance much better than some of the other kinds such as Cinnamon Fern, Lady Fern, and Ostrich Fern. Its unusual appearance when fruiting once caused a little girl of my acquaintance to name it the "long-legged fern."

Has anyone found any special features by which it may always be differentiated from the Cinnamon fern? I once noted the difference in the shape of the petioles of these three species which would make possible their identification merely from the root masses.—R. C. B.

American Fern Society

The Philadelphia meeting of the American Association for the Advancement of Science during the holidays gave opportunity for a meeting of the American Fern Society. This was held, as two years ago at the similar Washington meeting, on New Year's day, and in the Botanical lecture room at Macfarlane Hall of the University of Pennsylvania. In the absence of President Maxon, Dr. Wherry, chairman of the committee on arrangements.

was chairman of the meeting. There were about twenty-five present to hear the papers and to see the exhibition.

As at Washington two years ago, the subject of this meeting was The Ferns of the Local Region, *i.e.*, of Philadelphia. The meeting was notable for the delightful presentation of the subject in a series of lantern slides illustrating an unusually interesting address, delivered by Dr. Wherry. These slides were colored and most of them were made from pictures taken by Dr. Wherry himself. The Philadelphia region is notable in two or three particulars, first for the ferns and their allies in the Pine Barrens of New Jersey, then for the type station of the Hybrid Spleenwort (*Asplenium ebenoides*, R. R. Scott); and third for the group of rock spleenworts along the banks of the Susquehanna just above the Maryland line. All of these were splendidly illustrated on the screen and carefully described. Dr. Wherry's illustrations suggest a method of collecting the ferns which many of us might follow; and from the wider adoption of it produce a remarkable collection which no herbarium could equal for interest and illustration even though it might and certainly would fail to give the details which an herbarium alone could give. Among the ferns which were described one noted especially the following: the Bog Adder's-tongue (*Ophioglossum arenarium* E. G. Britton, or *O. vulgatum*, var. *minus* Moore) and Curly-grass Fern (*Schizaea pusilla* Pursh), in the Coastal plain and with these, though not limited to the coastal plain, the Climbing Fern (*Lygodium palmatum* (Bernh.) Sw.), which is so abundant in certain parts of the Pine Barrens; and the Virginia Chain fern (*Woodwardia virginica* (L.) Sm.) which is such a nuisance in the cranberry bogs that the growers treat it as a noxious weed and are forced to replant their bogs at intervals because of its prolific development.

From the Piedmont province we saw pictures of the Hybrid Spleenwort (*Asplenium ebenoides* R. R. Scott), in one place growing in close proximity with its forebears; the Lobed Spleenwort (*A. pinnatifidum* Nuttall), and the recently discovered and described Susquehanna Spleenwort (*A. Trudelli* Wherry). The Bradley Spleenwort (*A. Bradleyi* D. C. Eaton) and the Mountain Spleenwort (*A. montanum* Willd.) were also illustrated. We would not give the impression that these spleenworts were the chief or only important series which Dr. Wherry showed; but, as being uniquely abundant in this territory, they attracted special attention.

This attention was the more notable as they were also shown to us in herbarium sheets, mounted on the wall behind the speaker. Mr. Harry W. Trudell, of Philadelphia, after whom the Susquehanna Spleenwort is named, brought a large series of sheets, which, with additional ones from the writer's herbarium and some sheets of *Isoetes* from the University herbarium, made the meeting unusual as setting before us actual specimens of the ferns of a given territory. Practically all the known ferns, save some very common ones, from within a hundred miles of Philadelphia, were on exhibition in these herbarium sheets.

The second paper was an informal description by the writer of this article of the exceptional and rarer ferns found along the Delaware, from shortly above Philadelphia to the Delaware Water Gap. Most of these have already been described in the AMERICAN FERN JOURNAL and do not need repetition now. The presence of Goldie's Fern (*Thelypteris Goldiana* (Hook.) Nieuwl.) just above Trenton is a new southern location for this fern.

One of the most interesting papers, a mere preliminary study which should be developed by its writer and published in THE FERN JOURNAL, was one on the Variations

of the Christmas Fern (*Polystichum acrostichoides* (Michx.) Schott) by Rev. Fred W. Gray, of Cass, W. Va. Mr. Gray has already done fine work in the descriptions of the West Virginia variations in the common polypody (*Polypodium virginianum* L.) and has now made the preliminary studies for a similar description of the variations of the Christmas Fern. With the paper was presented a series of twenty-five sheets of this fern, all from his own territory and each differing in some way from the others. And the variations shown were only a part of those he has found. They ran the gamut of divisions, from one scarcely more than pinnatifid, reminding one of the polypody, to examples of var. *Schweinitzii* (so marked) in which at least half of the pinnae were themselves pinnate. (A similar sheet with this same effect in the lowest pair of pinnae alone was shown by Canon Lewis from the Adirondacks.) Mr. Gray made some tentative suggestions as to possible variation characteristics, which are not due simply to conditions of growth.

Mr. James Grimshaw Scott, the son of the discoverer of the Hybrid Spleenwort, often known as Scott's Spleenwort, presented some interesting reminiscences of his father, and also described the efforts which are being made to have a bill passed making the fern the Botanical Emblem of the State of Pennsylvania.

The meeting closed with a discussion of the proposed field trip to the lower Susquehanna Valley, for the week-end July 2–4, 1927. This would seem the more opportune as the building of a great dam across the river at the Maryland line in the immediate future will render this territory not only less accessible but will also flood out some of the localities which well deserve visiting. Further details of this will be announced later.—C. S. LEWIS.

In the death of Professor James Furman Kemp, professor of geology at Columbia University, on November 27 last, the Fern Society lost one of its most distinguished members. Professor Kemp had been a member since 1922, but had long been interested in ferns, and had followed this hobby in connection with his field work in geology. He was a man of unusually charming personality and a well recognized leader, especially in the field of applied geology. The feelings of those who have known him best are so well expressed by Professor C. P. Berkey, of Columbia, that quotations from the latter's article in the number of *Scicnce* for December 31 express with particular aptness the high esteem with which he was regarded. It was the writer's privilege to take a course at Columbia in which Professor Kemp was one of the lecturers.

"He had a genius for friendship with men. He liked to meet people. His circle of acquaintance was surprisingly large and he seldom forgot a face or a name. It is rare to find a man with such a gift, whom every one instinctively feels is his personal friend. Such, however, was the fine fortune of Professor Kemp, whose death has brought a feeling of bereavement to thousands of associates and former students.

"Forty years of his life were devoted to service as a teacher, a calling that he looked upon as the greatest of privileges.

"The genial kindliness of the man and the personal attachment that always developed as acquaintance lengthened tended to overshadow the excellence of his many other qualities. As a consequence, his students developed a desire to speak of him in more endearing terms than those usually applied to an excellent instructor. Thus the familiar name, 'Uncle Jimmie,' came. 'Professor Kemp' of the first day soon became 'Uncle

Jimmie,' to stay unchanged to the end of the story. For more than twenty years I have known every class that passed through his hands and have never seen an exception among them all. To every one he soon became 'Uncle Jimmie,' the beloved."

The death of William G. Lightfoote, of Canandaigua, New York, a member of the American Fern Society since 1924, occurred at a local hospital October 4, 1926. He was born in Canandaigua, March 3, 1854, the son of the late John and Jane Gravelle Lightfoote, who came to the United States from England and settled in the house in Gibson Street, where their son was born and always made his home.

His profession was that of abstractor, first as assistant in the county clerk's office, later as joint proprietor of the Abstract Guarantee Co., finally as representative of the Empire State Abstract Co. All his life long, Mr. Lightfoote took an active interest in religious, moral, and philanthropic matters. He was a member of the Methodist Episcopal Church, serving as superintendent of the Sunday School for forty-seven years. He was prominently identified with the Ontario Sunday School Association, of which he was made honorary president after twenty-five years as head of the organization. He had been president of the Chautauqua Circle since its organization about thirty-five years ago. For the last few years he had served as president of the Canandaigua Botanical Society and also held the office of secretary-treasurer of the Ontario County Farm and Loan Association and was active in the Canandaigua Bird Club.

Funeral services were held October 6 from the church he had served so long, a fine tribute to his memory being paid by his pastor, the Reverend Stephen S. Pratt, D.D.

New Members:

Baber, Dr. E. A., Longview Hospital, Cincinnati, Ohio.
Cook, Mrs. Helen Newman, 5901 Bellona Ave., Govans, Baltimore, Md.
Eaton, Prof. E. H., 678 Main St., Geneva, N. Y.
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Evans, Miss Mary, St. George's Road, Ardmore, Pa.
Fox, Mrs. Joseph M., 7913 Crefeldt St., Chestnut Hill, Philadelphia, Pa.
Little, Elbert J., 708 North G St., Muskogee, Okla.
Sayres, Mrs. Edward S., 1825 Spruce St., Philadelphia, Pa.
Woolman, Miss A. C., 21 North Highland St., Lansdowne, Pa.

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Anderson, Miss Flora C., 710 Fess Ave., Bloomington, Ind.
Carhart, Macy, 1462 Morada Place, Pasadena, Cal.
Cheever, Dr. A. W., 203 Clinton Road, Brookline, Mass.
Fazio (not Fazro, as in the published list), Mrs. Ernest, West Grove, Pa.
Gilmore, Mrs. Elizabeth, 125 South Whitney St., Youngstown, Ohio.
McAvoy, Miss Blanche, 206 South Main St., Norwal, Ill.
McIntire, Mrs. Jessie, R. 5, Box 515B, 2930 Waverley Drive, Los Angeles, Cal.
Martin, Everett P., 26 Van Riper Ave., Flushing, N. Y.
Mulliken, Robert S., Dept. of Physics, Washington Square College, New York University, Washington Square East, New York City.
Oleson, O. M., Lock Box 799, Fort Dodge, Iowa.
Rooney, Anna K. (Mrs. Frank M.), 810 East 40th St., Brooklyn, N. Y.
Spalding, Miss Rebecca W., 270 Convent Ave., New York City.
Taylor, William Gavin, 362 East 38th St., Paterson, N. J.
Wheeler, Mrs. George C., 5040 Tibbett Ave., Fieldston, Bronx, New York City.

The officers' reports for 1926 had not been received at the time of going to press.

In accordance with suggestions made at the Philadelphia meeting, January 1, 1927, it is proposed to take a fern-study field trip to the lower Susquehanna Valley, July 3–5, 1927. Many rare rock ferns, especially rare Aspleniums, will be seen. Final plans will be announced in no. 2 of this JOURNAL.

MARY F. WRIGHT,
HARRY W. TRUDELL,
EDGAR T. WHERRY,
Committee.

Mrs. Helen Newman Cook, who has recently joined the Society, wishes to obtain the following numbers of the *Fern Bulletin*, to complete her set: in vols. 1–3, nos. 2, 3, 4, 7, 11; in vol. 4, no. 1; in vol. 5, nos. 1 and 3; in vol. 19, no. 3; in vol. 20, no. 2. She has extra copies of vol. 8, no. 3; vol. 19, no. 4, and vol. 20, no. 1. Can any of the members supply her needs, or part of them, or use the extra copies she has?

It is a particular pleasure to receive Mrs. Cook into the Society, since she is a daughter of one who was for many years a valued member, President Stephen Morrell Newman of Howard University.

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E. J. WINSLOW C. A. WEATHERBY

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American Fern Journal

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Some Adirondack Rarities

WM. F. LEWIS

The title of this little account might well be "Rain," for this past August was one of the wet periods in the higher Adirondacks, but, as the reader will soon discover for himself, this sad fact had a very important bearing on more than one of the trips and more than one of the finds which set apart the summer of 1926 as a star year for the writer. Very few of the climbs I took were free from excess moisture or the threat of it, and yet, in spite of this fact, I almost feel a debt of gratitude to the clouds which soaked me more than once.

The Adirondacks, as will be seen by a very brief glance at the "Annotated List of the Ferns and Flowering Plants of the State of New York" or the article "Ferns of the Marcy Region" in the JOURNAL for January–March, 1926, contain a rather goodly number of ferns which are decidedly rare in this part of the continent. Moreover, the stations so far reported have been themselves isolated and apparently sporadic colonies of ferns native to Canada, and of other lovers of the North. *Thelypteris fragrans*, for example, was known from only two places, Avalanche Pass and Edmonds Ponds: *Woodsia alpina* was reported from the same spots: and prior to 1925, *W. glabella* only from Little Falls where it was last found in 1847. There was a record which

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credited it to Avalanche Pass, but it was proved to be a mistaken identification. From the last six summers which I have spent among the Adirondacks peaks and particularly from the last two, I have come to the opinion that all three of these and a number of others perhaps not quite so rare are to be found well established in the higher Adirondack region in practically every place which offers a satisfactory habitat, and these are by no means so few as might be expected.

Naturally the first place in which one looks for rarities is the location in which they are already known, and so, for a number of years, the massive cliffs of Mts. Colden and MacIntyre, which drop sheer into the depths of Avalanche Lake, had been a Mecca to which my father and I hoped to make a pilgrimage. Several times I had been through the Pass but always in a hurry, usually in the rain, and inevitably with complete concentration on the trail which is scarcely one to encourage either star or fern-gazing. So until the summer of 1923 I knew nothing of the treasures there. In that year, after hearing of the record of *T. fragrans* in the Pass, I found it and found it without any great need of climbing, in a place where I was ashamed at not having seen it before. But there was still lacking any opportunity really to fern over the cliffs. In 1924 we made a special trip for the express purpose of exploring the rocks, but we made a fatal mistake. We devoted the first day to climbing Mt. Colden and spent the night in the Lake Colden camp only a mile from the treasures. And next morning it began to rain and rained steadily harder, as if in answer to our plan of waiting for clearing, until it was obvious that we were doomed to another drenching and might as well take our medicine. But this time in spite of the downpour we did get at the cliffs and found, under an overhanging ledge which the rain had turned into a

waterfall, *W. glabella.* No doubt of it this time; the plants were abundant and the smooth green stipes left no question as to the true name of our find. And a few minutes later we discovered one lone plant of *W. alpina* high up in a crevice. Wet and cold as we were the trip back to the Lodge was a triumphant one. But we still were not wholly satisfied for there was much more promising territory that remained unexamined. Avalanche Pass was to see us again.

That same year we made an attempt upon the cliffs about Edmonds Ponds (Cascade Lakes) but here we had no such success. One lone discovery we made and only one. *Cryptogramma Stelleri* was growing abundantly in one little crack in the midst of a cliff that we supposed to be quite without lime deposit. Later we discovered that *C. Stelleri* was by no means so rare as the nature of Adirondack rock would lead a novice in geology to suppose. There are scattered outcroppings of calcareous rock all through this region of the higher peaks and just before we left the mountains we found more *C. Stelleri* on the lower cliffs of Armstrong.

In 1925 we added but little to our list of finds. Another attempt on Avalanche Pass was thwarted by rain, although it was enlivened by the discovery of one plant of *Polystichum Braunii* which we already knew from Indian Pass. The slides on the Giant offered nothing new, and the cliffs of Porter and Twin disclosed only some unusual and apparently more northern forms of *Cystopteris fragilis* and *Woodsia ilvensis.* Nor did we get near enough to the real rocks in going through the Panther Gorge to discover new material there.

But this last summer, that of 1926, things began to happen. For some time I had longed to climb the face of Mt. Haystack out of the heart of Panther Gorge as a stunt trip, and last August that was my first big trip.

The ascent, something near 1,700 feet in about three-quarters of a mile, involved a great deal of hard scrambling through densest balsam scrub, and rather less rock climbing than I had expected, but on those rocks where they were most exposed and inaccessible grew whole clumps of the finest *Woodsia alpina* I had ever seen. What a location! One looked out over the absolute wilderness of the Gorge to the towering cliffs of Marcy, and in the midst of all that grandeur grew this beautiful little fern. It was a new station, the first time I had ever found *W. alpina* unaided by older records.

Another trip along the upper reaches of the Ausable River revealed an abundance of *Cryptogramma Stelleri*, exceeding that on the limestone rocks in Vermont; but it failed to provide either *Asplenium trichomanes* or *Camptosorus rhizophyllus*, which seemed conspicuous by their absence about Keene Valley, but which we had hoped might be in hiding on some of that calcareous rock. There was no trace of either, however, although we again defied the rain and searched the rocks well; and we were obliged to turn back in disappointment.

Next day, however, was clear and we, at last, conquered Avalanche Pass. We had played at being the King of France and forty thousand men a week earlier, once more thanks to the weather, which provided me with a record of nine trips to or through the Pass and six drenchings. This time we had good fortune; and satisfied ourselves that, although it held no rarities save the three already discovered, at least the rock was ideal for them, for we found all three in abundance and the Woodsias were of exceptional size and beauty. Certainly when one has seen *W. glabella's* tiny green plumes against the crevices of a towering cliff, one is almost inclined to consider it the loveliest of all our rarities.

But our rejoicing over the ferns of the Pass became almost a small matter the following week, and again

thanks to the rain. Another of the downpours which characterized this last August caused the postponement of a long contemplated attempt on Santanoni Peak, but when it let up in the afternoon we turned our attention to some cliffs in the upper end of Keene Valley. There to our great delight we discovered what we had so long sought in the higher Adirondacks, *Asplenium trichomanes*. The rock was another of the limestone outcroppings mentioned earlier and there was an abundance of *Cryptogramma Stelleri* and *Cystopteris fragilis* in glorious profusion. The *A. trichomanes* was not so abundant and I have seen larger plants, but it was there, plenty of it and there could be no mistaking the vivid green pinnae and the black stems flattened against the rock. I doubt if any one ever sees it without pleasure, but I am sure I never was so delighted by it as on that rainy afternoon. Only one thing was lacking to complete our triumph, *Camptosorus rhizophyllus*. That we did not find either that afternoon or later, yet I still cling to the belief that it will turn up one day on those Keene Valley rocks.

One such discovery ought to have been enough for one week, but it did not fill up the measure of that one. The next day an apparent clearing away of the storm lured a friend and me to start for Santanoni. We made camp near Lake Henderson as we had hoped and, with every promise of good weather on the morrow, it seemed that we had a very fair chance of success. Next morning, however, the clouds hung low over the streams and lakes and a higher layer completely obscured the summits in a most depressing fashion. We started early just the same, on the chance of its clearing, to go across Mt. Henderson and strike the Santanoni trail. On the map it had seemed quite feasible, a mere matter of crossing a ridge and finding a well marked trail on the other side. On a morning as thick as pea soup, when both valleys and summits

were hidden in the clouds, it proved to be quite another matter; and when, after crossing two ridges, we found no state trail and could get no bearings at all we decided to play safe and take an old wood road which in due time brought us back to Lake Henderson, three hours and two miles from our starting point. The only hope left was to skirt the shore of the lake and pick up our trail further out and this we undertook. The going grew steadily rougher until finally we were forced to work our way under some cliffs going more on four feet than two. There at the base of a great face of rock we found *Thelypteris fragrans*. As I look back on it the plants seem almost as big as the heads of lettuce, which I am sure is an exaggeration, but wonderful bushy tufts they were, much thicker and larger than any we had seen in Avalanche Pass and so densely covered with scales that I wondered if this could be Prof. Fernald's true Arctic form instead of the temperate var. *Hookeriana*; a "wonder" speedily dispelled by a specimen of the true form which he kindly sent in answer to my inquiry. But variety or not here was excuse for the whole trip, and with those specimens safely stowed away what matter whether it rained (as it did) or not; what matter even that time pressed and we failed to make the summit! Santanoni remained to be climbed at our convenience in better weather, but only the rain and fog could have sent us to that new station for *T. fragrans*.

Only one other day during the summer eclipsed that glorious failure, and that, with a real sense of climax, proved to be practically my father's and my last trip of the season. Still in hope of *C. rhizophyllus* we turned our attention to the shores of the Ausable Lakes, and there in no very great space we found all the glories of the summer rolled into one spot, save only *A. trichomanes*. *T. fragrans*, far larger than any in the other

stations, curled gracefully down over the calcareous shaly cliffs, with some fronds a foot long. In the crevices grew *W. alpina* and a little further on an abundance of *C. Stelleri.* Finally, and most beautiful of all, *W. glabella* flourished in a shaded spot behind some little bushes right on the face of the cliff. And every one was so far unreported from that place.

For the present my story ends there. About every one of the lakes overhung by cliffs which I explored there grew at least one and usually three or four of these rarities (Cascade Lakes also disclosed *T. fragrans* and *W. alpina* to other searchers where we failed) and in addition Haystack furnished *W. alpina.* One of these days I hope to get back and see if my contention will not bear further examination, and the rarities of the higher Adirondacks prove to be the regular denizens of those high cold crags, and not merely sporadic visitors from the north. And I still hope to discover *Camptosorus rhizophyllus.*

JEFFERS, MONTANA

Spiral Shoots of Equisetum[1]

JOHN H. SCHAFFNER

One of the most striking features of the horsetails is the decided internodal development of their shoots. Any deviation from this condition will, therefore, arrest one's attention and curiosity. In the last two years I have several times found shoots in which the leaf sheaths did not form whorls but were developed as perfect spirals. In the change from the whorled to the spiral condition only a short segment of a shoot may be involved or the entire shoot or branch may have the spiral morphology.

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[1] Papers from the Department of Botany, The Ohio State University. No. 181.

Partially spiral shoots have been observed in *E. palustre* in northern Michigan. One such case is shown in Fig. 1. The lower part of the stem is perfectly normal and changes suddenly above a node to the spiral condition, the spiral making about one and a half turns, and then changes back suddenly to producing internodes again. The first internode above the spiral has spiral grooves and ridges but with the following internode the normal vertical grooving is attained and continues to the cone. The spiral part of the stem has developed a spiral of branches from the axils of the sheath segments. In the drawing a few of the spirally arranged branches are omitted in order to show the nature of the main stem structures more clearly.

Still more striking spiral shoots have been found in *E. laevigatum*. So far only two have been found and they represent distinct plants collected some rods apart on a railroad embankment near Cedar Swamp, Champaign County, Ohio. In these the entire aerial branch is spiral (Figs. 2 and 3). However, in both cases there was but a single spiral shoot in a large tuft of normally developed shoots with internodes. These shoots appear very much like an ordinary cigar. The shoot represented in Fig. 2 is 3¼ in. long and its spiral runs clockwise. The other (Fig. 3) is 4 in. long and its spiral is contra-clockwise. The shoots had practically attained their growth when collected and would not have elongated much more. Some shoots of the same crown and others nearby had attained a height of one to two ft. The shoots, as the drawings show, are much thicker than the normal shoots of the same crown and much thicker than any *E. laevigatum* that I have ever seen. These spiral shoots, as would be expected, had no cross diaphragms but a continuous cavity from the bottom to the top. There was a continuous strip of broken tissue following the spiral sheath on the wall of the cavity.

The direct cause for the development of these peculiar spiral shoots of *Equisetum* is not evident. They are plainly of the nature of bud sports or bud fluctuations. In each case the bud changes its developmental play so that, instead of centers of growth or incepts of lateral organs being placed in numerous spirals in definite alternate positions with subsequent internodal growth, the incipient lateral points of growth are developed in one continuous spiral line with no internodal stretching between any two incepts. There is thus a very decided change in the hereditary expression. This change of expression may be due to a peculiar internal environment which may in turn be due to a direct external cause acting while the bud was developing the spiral. On the other hand, there may have been a mutative change in some hereditary factor itself, but if this was the case the mutative change reverted back to the original condition in the first example. It will be noted that the spiral expression did not cease suddenly, however, for although the internodal heredity was again active the peculiar spiral activity was still influencing the growth of the tissues and thus produced an internode with spiral arrangement of the ridges and grooves. In the case of the *E. laevigatum* shoots the spiral expression continued to the end of development.

In hemp plants, the writer has found out a way of changing the opposite leaf arrangement to an alternate phyllotaxy by means of proper illumination periods (see *Ecology* **7**: 315–325). A number of years ago, I observed a screw-palm which changed suddenly from a perfect 3-spiral to a straight 2-ranked condition, and continued thus for five years when it went back suddenly to the perfect 3-spiral expression.

It is evident that the horsetails have come from ancestors, related to the ferns, without internodes and with normally developed, separate, spirally arranged leaves.

This condition is still evident to a certain extent in the cones. In the abnormal shoots under consideration, something happened which interfered with internodal developmental activity and at the same time influenced the determination of growth centers for the lateral organs so that these centers were organized in a single spiral succession. The loss of internodal expression was probably due to an induced abnormal physiological condition.

COLUMBUS, OHIO.

EXPLANATION OF FIGURES

1. *Equisetum palustre*, showing spiral zone in middle of a normal shoot with the leaf sheath and branches both arranged spirally. 2. Spiral shoot of *E. laevigatum* with complete clockwise spiral. 3. Spiral shoot of *E. laevigatum* with complete contra-clockwise spiral. Slightly reduced from original size.

A Caribbean Cruise and some Jamaican Wayside Ferns—II

F. E. CORNE

From Santa Marta we returned to Cristobal, where we had time to land and invest in Panama hats and bags, then sailed back to Kingston, where we left the ship and took up quarters already engaged for us in a family hotel, a pretty house with broad verandas one over the other, set in a garden full of tropical trees and shrubs—bread fruit with blossoms like white candles, a poinsettia tree bearing a number of scarlet flowers and no leaves, plants of begonia as large as bushes. The trellis of the dining piazza was covered with a vine bearing large cream-colored blossoms not unlike roses, star jasmine grew over the banisters, and in the flower-beds were dozens of plants of a *Nephrolepis* called locally the Prince's Feather. The largest fronds were perhaps 14 or 15 inches

Spiral Shoots of Equisetum

high and 6 or 7 broad and once pinnate, with each pinna deeply and irregularly incised, giving the appearance of a fringe. The lower part of the rachis and the stem were of a soft maroon color.

One day we visited the Hope Botanical Garden, about five miles from Kingston, where there is a nursery of plants and where I expected to find a number of native ferns. Alas, the whole collection had been taken to England to exhibit at the Horticultural Fair. But I got a frond of *Adiantum caudatum* growing near the water garden and another of a slender sword fern, *Nephrolepis Duffii*. At Hope Garden we were caught in the only real shower we experienced while on the island, a downpour which soon made many of the paths impassable, and we took uncertain refuge in one of the greenhouses. These houses are glazed over, but all the sides left open to the weather the year round.

The following week we went to Mandeville in Manchester County at an elevation of 2,200 feet above the sea and with a beautiful view of distant mountains. At the hotel here, as elsewhere, we found potted wild ferns used freely as decorations for living rooms and dining verandas, while in the garden grew *Nephrolepis Duffii* and *Adiantum trapeziforme*. Some woods were not far off and these I planned to explore, but again I was warned to keep away from them. In midsummer, I was told, for some weeks or months they would be perfectly safe, and at any time most of the higher mountains would be—but not here at this season.

Well, prudence seemed really the better part of valor—I had no desire to be incommoded during my short stay, and very reluctantly gave up the plan—that is, the plan of visiting the woods, but by no means the hope of hunting ferns. To be in Jamaica with its 470 species and gather no ferns was not to be thought of. I had noticed

some by the roadside on the way from Williamsfield station and hoped that the neighboring hedges and byways would surely yield a few; and I was not mistaken.

My first find was on the way to Mandeville village. On a boulder close to the road, and thickly covered with yellow dust, I found a gracefully creeping little fern, pinnate, with crenate pinnae not more than three-quarters of an inch long and half an inch wide, these growing smaller and smaller toward the tip of the frond until not larger than a pin-head and every now and then starting a new plant. Later, nearer the sea, I found it again with somewhat larger leaves. It was the *Dryopteris reptans.*

Mandeville resembles an English village, its church, municipal buildings, and odd shallow shops surrounding the village green. The solid, square, stone church stands in a fair-sized yard, the graves of which are covered by the stone table variety of monument. Among these were growing some thrifty plants of holly fern, *Polystichum triangulum,* and near the stone steps which wind around on the outside of the church to the belfry above grew one plant of a lip fern, *Cheilanthes microphylla.* On the lateral branches of a large cotton tree were quantities of a resurrection polypody, the fronds brown and twisted with the long drought—but these were beyond my reach.

Next day I explored the road in the opposite direction, where the stone walls and more shade looked promising. Here, growing on top of a wall, I found quantities of a resurrection fern, *Polypodium thysanolepis.* Nearby, also on the stones, were some curious little plants, curled and brown like the rest. These had simple lanceolate fronds, the largest about five inches long by half an inch wide. All became fresh and green after a few hours' soaking. To my surprise I found that while I had thought the little plants all alike, they were of two kinds, one, *Polypodium astrolepis,* bearing long clusters of spo-

Dryopteris reptans, Showing the Long Tips of the Fronds, One, at the Left, Producing a Little New Plant.
(Photograph by the Brooklyn Botanic Garden.)

rangia, the other, *P. heterophyllum*, round ones. The only other discernible difference was a slight brownish tinge on the rachis of the former, while the latter was all green.

At the foot of the wall among stones and grass grew quantities of a very beautiful form of *Polystichum triangulum* with small pinnae growing so close together as to be at times almost imbricate, and all curled and crisped. The fruiting fronds varied from four to fourteen inches high. Here also was a small form of *Polypodium Plumula* about four inches high, with pinnae set close together and so very narrow there scarcely seemed room on them for the two rows of tiny fruit-dots. In contrast to this, not far away grew *P. pectinatum* three feet tall and with very distant pinnae.

Further down the road, in the sunshine, was a feathery looking bed of bracken, *Pteridium caudatum*, and not far off *Pteris longifolia*. By a garden fence I found *Dryopteris effusa*, and further on, *D. normalis*, *D. serrulata*, and *Polypodium asplenifolium*, *P. suspensum* and *P. phyllitidis*, a strap-like fern suggesting the hart's-tongue, but coarser and pointed at both ends. All these within two miles of our hotel.

As the habitat of these ferns was close to the road, the passing natives were naturally curious. I was asked for money; to buy lace, by a girl who knitted as she walked; also to buy a parroquet and some finches in a cage; and one attractive little girl of 8 or 9 offered me—herself! I asked if she had no mother; "Oh, yes, but my mother is so very, very poor. She says if she can find a good home she will let me go." One day a bright looking boy of 14 or 15 came running up, his black eyes flashing with interested curiosity, and asked what I was looking for. When I told him, he offered to show me a place in the woods where there were "loads of ferns." I declined, but sug-

gested that he could get some for me and bring them to the hotel. Sure enough, on my return I found some large plants on top of the letter-box on the veranda, and soon he came again with another plant or two and offered to mail me some to "the States." Unfortunately, I had had sad experience with some sent from England, and returned ruined to the sender, and knew that under our stringent new laws it could not be. So I gave David sixpence (I had been warned not to spoil him) and he ran off happy. He had brought plants of *Polypodium aureum*, *Dryopteris ampla*, and *Tectaria cicutaria*. The large roots were donated to the hotel garden.

CAMBRIDGE, MASS.

(*To be continued*)

A Suburban Fern Bed

C. E. WATERS

One of the advantages of having a suburban home is the opportunity it affords of trying to make plants grow, and of learning that the newspaper cartoons depicting the trials and pleasures of amateur gardeners in the spring are not unduly exaggerated. The city dweller who moves to the suburbs "for the sake of the children" all too soon finds that there was a deeper reason that he did not foresee. This is the conclusion arrived at after fifteen summers of struggling with clay soil, bugs, storm drainage from the neighbors' yards, squirrels that work hard at reforestation with oaks, and rabbits that eat plants and attract stray dogs. Especially the dogs. It is astonishing to see with what precision they can put their paws on young plants in a row, even at night. This is fine sport for them, but best of all pleasures is to jump over a four-foot hedge and land among the tallest fronds

in the fern bed. This deeper reason is to learn to be cheerful in adversity.

This fern bed is in a corner, running some thirteen feet along the east side of the hedge, and eight feet along the north side of a stone wall. The front is a curving line, so that the bed is only two feet wide at the end farthest from the wall. It has the shape of one of the simpler corner pieces of a picture puzzle. Let us see what grows in it.

Next to the wall, at the point farthest from the hedge, is a plant, or rather a clump, of *Scolopendrium* which has been the subject of a note in this Journal. Adjoining this is the rockery, a small mound raised hardly two feet above the level and four feet across. It has a nucleus of ordinary clay soil which is covered with stones of various sizes. In their crevices are now growing *Woodsia ilvensis*, *Cheilanthes lanosa*, *Polypodium vulgare*, *Asplenium trichomanes* and *A. platyneuron*. Towards the back where it is shaded by two large plants of *Dryopteris marginalis* and other species is a colony of *Camptosorus*. There have been numerous failures on the rockery. For years the polypody refused to grow there, but is now well established. The *Asplenia*, *ruta-muraria*, *bradleyi*, *pinnatifidum* and *montanum*, all failed to survive one winter. *Pellaea atropurpurea* struggled along for a few years, and for three summers a plant of *Asplenium ebenoides* produced fronds. Each season one or two of the fronds showed signs of proliferating, but no new plants could be raised. Small stones were placed near the ends of the fronds to hold them down to the soil in the crevices, but they were always pushed out of place. There were signs to indicate that this was done by large slugs that came out at night to feed. One of the satisfactory plants on the rockery is the orchid, *Liparis liliifolia*. This has a bulbous root that nothing seems to

harm. It has practically no fibrous roots and it is somewhat of a mystery how it manages to live and bloom. A few plants of rue anemone persist in coming up between the stones year after year, in spite of having their leaves removed as soon as they are noticed. The partridge berry, too, turned out to be a nuisance by nearly choking the walking fern out of existence.

Behind the *Dryopteris marginalis* which shades the walking ferns is a tangle of plants, most of them *Athyrium thelypteroides*, with some lady fern, maiden-hair and broad beech fern. Early in the spring the last two can be seen and admired, but they are soon nearly hidden by the rank growth of the larger ferns. With them are some plants of bloodroot and a few discouraged stalks of bee balm. For four or five years after the last was planted it bloomed sparingly on a half-dozen or so small stems, but one year it suddenly spread and threatened to destroy the ferns, so all but some stray rhizomes were uprooted. This part of the fern bed is the favorite landing place of the dogs that jump over the hedge. They then wade out to the walk, with results that need not be described. It is pleasant to look out of the window some summer morning and see that there has been a visitation during the night. This summer the dogs came in July and now, early in October, there is a good growth of new fronds of the silvery spleenwort.

In an evil moment some plants of *Filix bulbifera* were placed at the foot of the rockery near the hart's-tongue. After being endured for five or six years they had to be destroyed lest they should crowd out more desirable ferns. Now, three years later, a frond is seen occasionally, apparently coming from a rhizome deep in a crevice.

At the other side of the rockery, where it meets the "lowland," are some *Woodsia obtusa* and *Dryopteris spinulosa*, both somewhat discouraged looking. If *F.*

bulbifera becomes a pernicious pest by scattering bothersome bulblets everywhere, its congener makes up for this lack by having an active rootstock. *F. fragilis* and *Dryopteris noveboracensis* struggle with one another as if trying to see which can first rush across the rockery. Both of them have to be pulled up by handfuls like weeds, and long ago the stone edging of the gravel path disappeared before their advance. No wonder the *Woodsia* and its neighbor seem discouraged.

The lowland contains enough species and individual plants for a much larger area. Barely nine feet long, its width diminishes from five feet at the rockery to two feet at the other end. Here it ends at a freely blooming bush of *Kalmia angustifolia* around which are a few plants of *Dryopteris marginalis*. For several years both of the chain ferns seemed to thrive here, and then suddenly disappeared. Scattered around are *Dryopteris thelypteris, D. goldiana, D. boottii, D. spinulosa* and two of its hybrids, *D. clintoniana*, lady ferns, narrow-leaved spleenwort and the three Osmundas, of which *O. cinnamomea* is always sterile.

If *Camptosorus* is the walking fern, *Pteretis nodulosa* deserves not the name ostrich fern, but traveling fern. Two plants were put near the middle of the lowland and next spring came up properly in place. Since then they have appeared wherever fancy has impelled them, for in addition to having a well-defined crown they produce long rhizomes at the ends of which fronds arise. One year the neighbor across the hedge was delighted by seeing a fine new fern among the few he had. It had traveled six feet from its parent. This year a spindly plant came up through the edge of the gravel path and the crowding *D. noveboracensis*. No one can say where it will appear next season.

Before the ferns were planted, lilies of the valley grew in the corner. They could not all be dug up, and for

years they had a few leaves, but were finally killed by the shade of the ferns. There are a number of flowering plants that hold their own: spring beauty and *Dentaria laciniata*, *Scutellaria ovalifolia* and *Arisaema dracontium*. The last has to be held under firm control. *Erythronium americanum* bloomed for two or three years and then died. Along the edge of the bed, next to the gravel walk, are numerous plants of the wild blue *Phlox divaricata*, a few yellow violets, *V. eriocarpa*, and the cream-colored *V. striata*. The last was introduced before its true nature was known. It refuses to be exterminated and can hardly be kept within bounds.

Two more conspicuous failures should be mentioned. Neither *Botrychium virginianum* nor *Ophioglossum vulgatum* survived one winter after being planted.

Nothing has been said about the Christmas fern, and none have ever been in the fern bed, because there is a flourishing row of them along the north side of the front porch. Here, too, is the hay-scented fern that proved a failure in other locations. The sensitive fern accidentally got a start here, and can not be removed without disturbing the Christmas ferns. Pulling off the fronds seems to have no effect and it certainly does not induce the growth of *obtusilobata* fronds. In the angle formed by the steps and the porch are five or six large plants of *Dryopteris marginalis* and a dozen or more of *Athyrium pycnocarpon*. In the dense shade under the low fronds of the latter two small plants of *D. simulata* kept alive for four years, but are now gone.

On the whole the ferns have done well with almost no care. Sometimes in very dry weather they have to be watered. They receive no fertilizer except dead leaves. Each fall the leaves gathered from the gravel walks are scattered over the ferns, and on top of them are placed the dead stems of chrysanthemums and other plants to

hold the leaves in place. In the spring these stems are broken or cut into short lengths and left to decay. Some of the larger dead fronds are cut up too, so that they will not make a mat to hold down the new fronds. A few leaves and a handful of hydrated lime are placed around the hart's-tongue, and all is ready for the season.

CHEVY CHASE, D. C.

The Finding of Woodsia obtusa

JOHN B. TODD

I believe I was very fortunate in being born on a winter's day in a little cottage in the back woods of the North Country. My earliest memories are of the birds and flowers in summer, and in winter of listening to the mystic artillery of the frost in forest and pond. Often the snow lay from three to five feet deep and in thawing and freezing would form a hard crust upon which one could go anywhere with the utmost freedom; then my greatest joy would be in racing through the woods, often miles from home.

I learned that all the seasons of the year are filled with beauty, each presenting different aspects of the same thing. In the fall after the frosts have done their work, and all the tender trees and plants are stripped for winter's rest, there remain a few sturdy ones with vitality superior to frost and cold. A tramp in the woods is then a pleasure and joy, the long open vistas of hill and valley showing all objects standing out clear and distinct in the pure air. Even the storms add to the grandeur, making fall and winter delightful.

On a bright day late in the fall, a few years ago, I was at Rock Crest, near White Lake. From Pulpit Rock one could see the glistening water of Oneida Lake and beyond

many miles the dark sky line of Adirondack foot hills. All around were scattering trees, clumps of small cedars, and little park-like open spaces of rock-strewn ground upon which were growing thousands of Purple Cliff Brake, and numerous colonies of Ebony and Maidenhair Spleenwort and Walking Leaf Fern. The joy and pleasure of such occasions is increased if one has an appreciative companion, and my companion was in raptures with the beauty of the spot.

I then noticed a small, bright, green fern at the foot of Pulpit Rock and unconsciously thought "Bladder Fern," but then I remembered that the frost had already killed them, and then I knew I had discovered a new fern for the locality.

When we had become sufficiently calm to be able to examine it carefully, we found it to be a fingerling *Woodsia obtusa*. We found a dozen mature plants with fruiting fronds and sixty fingerlings and sporelings growing generally out of leaf mould underneath the projecting part of loose rocks. Last spring we counted two hundred and fifty, small and full grown, on a square rod.

One-fourth mile east from Pulpit Rock is a station for the Slender Cliff Brake, and not farther on is a station for *Botrychium onondagense*, while east from Pulpit Rock the finest of Hart's Tongue had their home in a deep dry pond, but they have been all removed to the Clark Reservation for safety.

This locality has been searched by many distinguished men in the fern world, the late Dr. Underwood, Drs. Maxon, House, Benedict and Petry, besides all the botany teachers and students of Syracuse University for years and years. How was it that none of these distinguished people ever found the *Woodsia obtusa*, and that I, an amateur very poorly equipped with fern lore, should find

it? My answer is that I do not think it grew there at the time the locality was under their observation. Probably the wind or the birds brought the spores there some time within the last few years. The environment was favorable and as soon as a single plant had matured, multiplication began, as it is evident that they are now spreading fast.

In finding them I was the object of good fortune. Had I visited the spot in summer, the chances are that I would not have noticed the Woodsia, as the Bladder Ferns are growing everywhere, but when the frost had destroyed them, the Woodsia was quite conspicuous, especially the fingerlings and sporelings which survive the frost.

SYRACUSE, N. Y.

THE FERN GARDEN OF AN AMATEUR.—About twenty years ago our family acquired a very small area of virgin woods (48 by 56 feet) at Mt. Gretna, Pennsylvania, and we have brought to it from time to time, as we have roamed the forest, many precious things, especially ferns, of which we have probably two hundred.

The Christmas fern predominates, but we also have Royal, Polypody, Sensitive, Cinnamon, Interrupted, Lady, Maidenhair, Broad Beech, *Botrychium obliquum*, *B. virginianum*, Bracken, Purple Cliff Brake, Marginal Shield, Ebony Spleenwort, Maidenhair Spleenwort, Silvery Spleenwort, Walking Fern, Bladder Fern, Dicksonia, Ostrich Fern, and last year, through the FERN JOURNAL, the rare Hart's Tongue.

Rocks are abundant, and we have surrounded the place with a wall and have also enclosed various little ornamental nooks and corners. The ground slopes slightly to the north, so we made little terraces, and on one of these, among other ferns and in the shade of a wild

grape-vine, the Hart's Tongue is bravely making its home. Pieces of limestone from a distant quarry were brought to keep it company and conditions are evidently much to its liking.

The place is quite intensive in its production of specimens. Of wild flowers there have been listed during the present year over eighty, from the Hepatica and Arbutus of the spring on through the summer visitors to the Asters and Goldenrod of autumn. Of trees there are White Pine, Hemlock, Poplar, Dogwood, Sassafras, Mountain Ash, Chestnut Oak, White Oak, Black Oak, and one or two Chestnuts which have thus far escaped the blight.

Standing on top of the boll of one of the felled Chestnuts, about eight feet above the ground, is a bird bath constantly in use, and one day when two male Orioles were there drinking and bathing with the sunlight on their handsome coats they added a touch of beauty to the picture. Other wild life is there, Chipmunks and Rabbits; and in the evening from far up the mountain comes down to us the call of the Thrush, the Whip-poor-will and the Owl.—SARA PERKINS BILL, *Harrisburg, Pa.*

A letter from Miss Natalie B. Kimber contains so vivid an account, so entertainingly put, of the troubles which, in some degree, fall to the lot of all fern gardeners that, with her permission, we here print a large part of it, sure that it will strike a sympathetic chord in the minds of many readers.

TROUBLE IN A GARDEN.—I am only a very green amateur, savagely struggling with "soils." So far the large ferns have caused me very little trouble, although the Woodwardias, preferring more acidity than I was able to give them, were slow in getting established, and

Athyrium angustifolium always looks rusty and unhappy. But the small ferns are a constant care. From the limestone cliff, some two feet long and six inches high, where *Pellaea atropurpurea* and *Asplenium Ruta-muraria* appear wretchedly uncomfortable, to an acid bed in process of construction to house *Asplenium pinnatifidum*, *Schizaea*, and *Lygodium palmatum* which I brought in this summer, the whole garden represents a continual struggle for existence.

Even the birds seem to be my enemies, for after bathing in the bird bath which I had made for them, the Thrushes scratched up some precious plants, carefully carried from the cliffs of Smugglers Notch, Vermont, while the Starlings ate the fruit from *Botrychium ramosum* and *lanceolatum* and chewed the entire stem off my choicest *Ophioglossum*.

Only an optimist could enthuse over some fifteen young "Arizonians" which travelled across the continent with me last spring and persisted, for the most part, despite the deluges of summer rains, which they strongly resented. Cheilanthes, Notholaenas, and Pellaeas are now crowded into a small fernery in our window, regardless of their preferences for exposed sunny cliffs or moist shady woods. And the most courageous are already sending up new fronds!

Perhaps if fern collecting were an easy matter it would lose half its joys.

California Cañon Ferns.—A sunny day in early June, and a tourist friend clamoring for California ferns for her collection. There was only one reply to such a delightful demand, and we took it—a trip to the foothills of the Sierra Madre.

The rainy season was over, and not until late autumn would the southern California hills again feel the life-

giving showers. Because of the long dry summer ahead, each plant and shrub was busily protecting, in its own ingenious way, its precious stock of stored-up moisture. For however romantic they may sound in verse and story, those long summer days of fleckless blue skies and golden sunshine mean almost desert drouth to California's wildings.

Cleverest in its protective scheme and dearest to her heart is a little fern. The "golden-back," they call it, for over its precious spores it has sifted a layer of golden powder. What could be more Californian than that?

We found this little fern nestling in the shelter of a clump of low shrubs on a hillside. Already its triangular fronds were losing their babyhood softness and taking on the leathery toughness of an "old timer." In little groups they grew, their shiny brown stems measuring nine inches to the frond tip.

Where the fronds extended into the full glare of the sun, they were tightly rolled and heavily dusted with the golden powder. Until the autumn rains should come, that powder would keep the fruiting spores from desiccation. But in the shade the fern still spread itself luxuriantly.

To child and adult alike, those powdered fronds presented an irresistible temptation to press one firmly against one's garment and to gaze smilingly at the imprint of a little golden fern left there. Peculiarly graceful and appealing are these small green and gold ferns, symbols of the glory of old Castilian days when they were first botanically discovered. *Gymnogramme triangularis* is their long botanical name, but to Californians they will ever belovedly be "little golden-backs."

Far more a true child of the sun is the curious "coffee" fern. On rocky stretches, or in hot sandy washes leading down from the hills, this wiry little fern finds a

foothold. Early in the season it is a deep green. But with the growing heat it acquires a rich bronze coat of tan.

Then, indeed, the reason for its name is clear to all beholders. Its small leaflets are just the shape and size of a coffee berry roasted brown. Serious-eyed collectors may murmur at sight of it, *Pellaea andromedaefolia.* But the children gaily exclaim, "Oh, there's a coffee fern!"

Another little wilding of the hills is the shy "lace" fern. Far back in the cool cañons it grows, where the sunlight sifts down brokenly. Much too frail for heat and glare is this delicate fern. And none too commonly does one spy its lacy fronds, half hidden by some overhanging rock. Its long botanical name, *Cheilanthes Californica,* when written a little large, will easily span a frond. And every native in those southern hills will eagerly inquire of you, "Have you found a lace fern yet?"—Ilsien Nathalie Gaylord, *Boston, Mass.*

A Fernless Area.—The pages of this journal during the past few years have contained several accounts of remarkably large numbers of species of ferns growing within a township, small county or other restricted area. It may be of interest to note an instance of the opposite situation, namely, the presence of an unexpectedly small number of species. In company with Dr. John K. Small I spent two days at Brownsville, Texas, in the spring of 1925, and under the guidance of Mr. Robert Runyon we visited a variety of localities of native plants up to distances of 25 km. or so out from the town. The habitats comprised dense woods, open woods, swamps, thickets, ditches, beds of temporary ponds, prairies, and dunes. One of the woods was full of palmetto trees, surrounded by luxuriant vegetation of various kinds, including at

least one epiphyte (*Tillandsia recurvata*, known as ball-moss), and there seemed every reason to expect epiphytic ferns to be growing upon them, as so many species do in similar habitats in Florida. In spite of careful search, however, not a single true fern was seen in the whole region, and the only pteridophyte observed was *Marsilea vestita*, which occupied some of the ditches. This was the first time I ever realized that a region of abundant and varied vegetation could be essentially fernless. Are such relations known elsewhere?—EDGAR T. WHERRY, *Washington, D. C.*

FINDING A NEW FERN.—In 1922 I was invited by a fern enthusiast to join an expedition to Green Bay on Manukau Harbor, the scene of Mr. Carse's recent discovery of an entirely new variety of *Lomaria capensis*, or *procera*. While on our way, one of the party told the following anecdote anent the difficulty in finding new ferns. A young enthusiast, bursting with energy, asked a botanist of profound learning if the Great Barrier Island was a good place for ferns. "It is an excellent botanical field," said the man of knowledge. "Several rare species grow upon the islands." "That's ripping!" replied the enthusiast. "I'm going to find a new species, even if I put in a week on the job." "It cannot be done," came the crushing reply. "New Zealand and the adjacent islands have been thoroughly searched and every species and variety of fern discovered and recorded in scientific publications by competent botanists before you were born." The young naturalist's ardor was nipped in the bud and his energies turned to a less hopeless task.

In refutation of the wise man's dictum Mr. H. Carse recently discovered, within two hours' drive of Auckland, a variety of *Lomaria capensis* (the most abundant fern in New Zealand, next to the common bracken, *Pteris*

aquilina) that I have not seen mentioned in our standard botanical works. It is a well-marked variety (if not species) of what is sometimes called the "Palm-leaf Fern," a species that grows everywhere in dense bush, swamps, and in the open, often festooning the steep banks of a road cutting. Dr. Hooker, in his New Zealand Flora, describes four varieties of *Lomaria procera*, a, b, c, d, but none of them resembles in the least Mr. Carse's find. The fern, which grows luxuriantly on the northern shore of Manukau Harbor, often to a height of several feet, is of a lighter green than the ordinary form; instead of the fronds being lance-shaped, they are broadly triangular, especially in the younger leaves; the lower leaflets do not gradually decrease until the bottom ones are mere green buttons, as in the typical form of the species, but are usually the longest, as in *Lomaria vulcanica*.

On reaching the seashore, we scrambled up a steep bank clothed with the evergreen New Zealand forest interspersed with tall tree ferns, *Cyathea medullaris* and *C. dealbata*, and were soon forcing our way through Mr. Carse's new fern that grew waist and shoulder high. We found it hard to tear ourselves away from the sylvan paradise. There were beautiful specimens of some of our rarer ferns—*Pteris saxatilis*, *Asplenium bulbiferum*, var. *laxum*, and *A. lamprophyllum*, which has recently been separated from var. *laxum*, with which it had formerly been confounded, besides many others too numerous to mention. On our way back we gathered several specimens of that quaint little fern, *Schizaea bifida*, growing on the roadside among the scrub and weeds, and looking like a slender straw supporting a tuft of brown seeds on the tip.

It is a miracle how this new Lomaria, growing in profusion under our very noses within ten miles of the metropolis of New Zealand, had so long escaped discov-

ery. Had the young enthusiast directed his steps to Manukau Harbor instead of to the Great Barrier Islands his dream might have been realized.—H. B. DOBBIE, *Auckland, N. Z.*

HIGH UP.—Mrs. Lombard's note in a recent number of the JOURNAL ("Deep Down") suggests the following account of an unusual habitat for a tree fern. While collecting ferns in southern Victoria in 1925, I discovered a specimen of *Dicksonia antarctica* growing in the fork of a Eucalyptus (gum) tree ten feet from the ground. It was about twenty yards or more from other tree ferns. It was about six or seven feet high and appeared to be thriving in its high abode. The part of the Eucalyptus tree where it was growing was decayed.—ALLAN MACCASKILL, JR., *Coleraine, Victoria, Australia.*

In reply to Mrs. Lombard's request for further information in regard to ferns in wells, Dr. Wherry refers us to an article by C. F. Saunders in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1900, p. 548. Mr. Saunders there reports that in an old well at Calico, in the midst of the New Jersey pine barrens, occur *Phegopteris Dryopteris*, which does not grow in ordinary habitats within fifty miles or more, and also "*Asplenium Filix-foemina*" and *Dryopteris* "*spinulosa,*" which (depending on what species or varieties are meant) also may not grow very near by.

YOUNG HART'S TONGUE PLANTS FOR 1927 DISTRIBUTION.—Some 250 young sporeling plants which were mostly too small for distribution last summer will be ready for shipment to members of the Fern Society during June. The additional year of growth has advanced the size and vigor of the plants, so that small fruiting

leaves are beginning to appear. It is hoped that applications may be widespread—from as many different states as possible.

If in your region you know of some shaded ravine with moist, but well drained, light wood humus soil overlying limestone rock, you can help in this conservation experiment by sending in your application for plants. Applications will be filed as received, and the number of plants distributed during June will be determined by the number of applications.

Will those to whom ferns were sent last year remember that reports of the wintering and spring condition of the plants set out last summer will be most interesting.

Applications for the 1927 distribution should be made to R. C. Benedict, Brooklyn Botanic Garden.

American Fern Society

Report of the President for 1926

It has been remarked often enough that the activities of the Society center in its JOURNAL, which thus may safely be taken as an index of our success or failure as an organization devoted to the interests of fern study. The statement is true, and a perusal of the current report of the Editors permits no doubt as to our satisfactory effort. Their report summarizes admirably what has been done during the year just closed, and points clearly the way to greater usefulness. Not only have the contents of the JOURNAL been varied and of unusual value, they have come from numerous sources and represent a helpful and sustained interest on the part of many members; and the membership is steadily growing, as might be expected. The new arrangement of distributing the JOURNAL directly from the printing office will mean a great saving of time and effort, and the storage of back numbers at the Brooklyn Botanic Garden will prove no less advantageous.

In this connection it is appropriate to put on record an expression of our deep appreciation of the services ungrudgingly rendered by Mr. E. J. Winslow for many years past. He was one of the founders of the JOURNAL in 1910 and has since served continuously as Business Manager, and during these sixteen years he has mailed all issues of the JOURNAL and provided storage facilities for back numbers; for all of which work there has been no recompense, other than the satisfaction that comes from fostering a worthy cause. The new plans of mailing and storage will bring relief from this steadily increasing burden, and the thanks of the Society are hereby tendered gratefully to one who for so long a time has been literally one of its mainstays.

The meeting at Philadelphia during Convocation Week proved a great success, and there is to be a field trip to the Lower Susquehanna Valley during the first week in July. It is hoped that meetings in other regions may be planned for, also. They are of value in many ways, not only to the individuals attending but to the Society itself, and almost invariably result in a few new members.

Altogether, the new year begins auspiciously, and—going back to the JOURNAL again—it behooves every one of us to do what he can to help the Editors in making Volume 17 the best one of all.

Respectfully,

WILLIAM R. MAXON, *President*.

Report of the Secretary for 1926

There has been but little to report for the Fern Society during the year which has not already appeared in the pages of the JOURNAL. The meeting at North Duxbury, Vermont, the only field meeting of the year, was reported in the JOURNAL for October–December, 1926. The Philadelphia meeting, also reported already, really belongs to the year 1927.

There has been little shift in membership during 1926. We have lost by resignations five members and by death four. On the other hand we have gained nineteen, making the enrolment at the end of 1926 three hundred and twenty-five. This growth is slow but steady and already there have been several additions for the new year.

Attention should be called to the proper method of enrolment of new members. The name and address, together with the name of the member recommending the applicant, should be sent, together with the membership fee for the first year, to the treasurer. He then transmits it to the Secretary, by whom the permanent record is kept.

Again let the members be reminded that there are files of the *Fern Bulletin* and the FERN JOURNAL which are for the use of the members upon application to the secretary, postage alone being required.

CHARLES S. LEWIS, *Secretary.*

Report of the Treasurer for 1926

GENERAL FUND

RECEIVED		
Cash on hand January 1		$ 668.30
Membership dues:		
1924	$ 3.00	
1925	16.50	
1926	381.40	
1927	56.92	
Total	$457.82	
Journal Subscriptions	84.28	
Illustrating Fund, gifts, etc.	17.48	
For author's changes, Journal acct.	10.00	
Emergency Fund (Back Nos. Journal)	19.15	
Advertising	4.00	
Reprints and postage	12.15	
Interest	25.00	
Collection fee	.10	
TOTAL RECEIPTS		629.98
		$1,298.28

PAID OUT		
Treasurer's expenses		$ 15.00
" for 1927 acct.		2.07
Secretary's expenses:		
Election notices	$ 13.30	
Binding Journals	7.00	
Membership list	34.25	
Postage	2.00	
		56.55
JOURNAL EXPENSES		
Illustrations, Budget	$ 30.00	
Illustrating Fund	9.94	
Total Illustrations	$ 39.94	
Printing	257.00	
Title page, contents, etc.	19.20	
Changes in proof	1.90	
Editor's expenses	17.67	
Extra pages	28.00	
Stencils for mailing list, and postage	19.28	
Insurance	10.00	
Total Journal Expense		392.99
Council Order No. 56, notices summer meeting		6.72
Council Order No. 59, notices winter meeting		10.18
Total Expenses		$483.51
Reprints and postage, returned		11.99
Transfer to Permanent Fund		100.00
TOTAL PAID OUT		595.50
BALANCE FORWARD		$ 702.78

This balance is made up as follows:

EMERGENCY FUND		
On hand January 1	$135.12	
Received	19.15	
	$154.27	
Transferred to Special Fund	100.00	
BALANCE ON HAND		$ 54.27

ILLUSTRATING FUND

On hand January 1	$ 35.80
Received gifts	6.00
Received from Mr. Ransier for Hart's Tongue plants	11.48
Total Received	$ 53.28
Paid for Illustrations	9.94
BALANCE ON HAND	43.34
Special Order for cataloging Herbarium, holding	25.00
GENERAL FUND ON HAND	580.16
TOTAL	$702.78

SPECIAL FUND FROM LIFE MEMBERSHIPS AND TRANSFERS

ON HAND JANUARY 1	$624.51
INTEREST RECEIVED	30.46
Transferred from Emergency Fund	100.00
ON HAND DECEMBER 31	$754.97

Respectfully submitted,

JAY G. UNDERWOOD, *Treasurer.*

Report of the Editors for 1926

The editors are happy to report another prosperous year for the JOURNAL. We again received, thankfully, an extra appropriation of $30 from the Council. We were the grateful recipients of generous gifts from Mr. H. E. Ransier, who made over to us the receipts, above expenses, from his distribution of hart's-tongues; from Mr. F. W. Kobbé, who turned in against certain author's alterations in proof about three times their cost; and from Miss Amey E. Lillibridge, who gave plate 11. Prof. J. H. Schaffner lent us the block for plate 6 and the Smithsonian Institution that for plate 10. With these aids we were able to publish eight extra pages of reading

matter and eleven plates. We have had contributions dealing with ferns of Canada, Mexico, Panama and New Zealand, as well as those of the United States. At one time we were short of copy, but an appeal for more met with a prompt, generous, and much appreciated response. We are now again free from any immediate worry on that score; but that statement is not to be interpreted as meaning that we do not, as always, want a steady supply of articles from our readers on anything of interest to fern lovers. There is a greater demand for brief "human interest" notes, telling of the excitement and pleasure of new finds or other adventures among ferns than, probably, many possible contributors, in their modesty, realize. The thrill of discovery may come harder to the veteran and the professional, but it is happily something which none of us outgrow, and for which we all have a fellow feeling.

The JOURNAL begins 1927 under a new arrangement. Hitherto, since its foundation, issues have been mailed by Mr. Winslow from Auburndale, Mass., and the files of back numbers have been stored in his house there. In future the mailing will be done direct from the Science Press Printing Co. at Lancaster, Pa., and the stock of back numbers, constantly increasing in bulk and value, will, through the courtesy of the Director and Trustees of the Brooklyn Botanic Garden, be given fire-proof storage there. Because of savings in postage and insurance and the generosity of the Garden authorities, who make no charge except for actual expense to them, the new arrangement is expected to cost no more than the old.

R. C. BENEDICT,
E. J. WINSLOW,
C. A. WEATHERBY,
Editors.

In connection with the storage of back numbers of the FERN JOURNAL at the Brooklyn Botanic Garden, an inventory of the files shows that the supply of scattered numbers has been much depleted. Within a given volume the number of copies remaining may vary from 21 to over 200. Appeal is herewith made on behalf of the Fern Society to the generosity of any members who may have extra copies of such back numbers for which they have no necessary use. A more complete report will be given later, but for the present may be noted that in volume 1, numbers 1, 4 and 5 are needed; in volume 4, numbers 2, 3 and 4.

It often happens that one receives a few extra copies in connection with some article printed in the JOURNAL, which are put away on a shelf and forgotten and of which no real use will ever be made. Any member who has publications under such circumstances will confer a real benefit to the American Fern Society by sending any available copies to the Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, N. Y.

PLAN OF TRIP TO LOWER SUSQUEHANNA VALLEY, JULY 2–4, 1927.—*July 2, Saturday.* Meet at Pequea (pronounced peck-way). This is reached either by trolley from Lancaster, on the main line of the Pennsylvania Railroad, or by local train from Columbia, Pa., south of Harrisburg, or from Perryville, about midway between Baltimore and Philadelphia, all on the Pennsylvania Railroad. The afternoon trains leave Columbia 3:55 P. M. or Perryville 3:45 P. M.; the trolleys every hour. Fair automobile roads run from the same points. All those who send in by June 25th the statement that they expect to attend will have rooms reserved for them at the Pequea Hotel. The total expense should not exceed $10. Camping out is also possible.

July 3, Sunday. Walking trip down the river, about ten miles at the outside. Ferns will be studied at Tucquan, McCall's Ferry, Cully, Face Rock, and Fites Eddy, eight hours being available for the trip; return by local train to Pequea for supper.

July 4, Monday. Take Ferry across the river to York Furnace, and explore ravines there (short walks); return to Pequea during afternoon in time to get train or trolley in either direction.

It is expected that most of the following will be seen; those marked with an asterisk (*) are apparently present in very small quantity, and participants are requested not to collect specimens of these, or at any rate not more than single fronds: *Asplenium bradleyi**; *A. bradleyi*×*platyneuron**; *A. gravesii**; *A. montanum*; *A. pinnatifidum*; *A. trudelli**; *Lygodium palmatum*; *Pellaea atropurpurea*; *P. glabella*; and many species of *Dryopteris*, *Woodsia*, etc.—EDGAR T. WHERRY, *Bureau of Chemistry, U. S. Dept. of Agriculture, Washington, D. C.*

It is not usual for the JOURNAL to print obituary notices of non-members; but the death of Alfred E. Urban, of Lancaster, Pa., is a matter of real concern to the Society. For the greater part (beginning probably with the third number of volume 1) of its sixteen years of existence, Mr. Urban, as manager first of the Intelligencer Printing Co., and since 1924 of the Science Press Printing Co., has looked after the printing of the JOURNAL. Himself a botanist and a lover of ferns, he has always regarded our enterprise with friendly and active interest and has done much to keep costs down to a practicable level. Probably we owe him more than we know.

Mr. Urban died, following an operation, Feb. 3, 1927, aged 55. He was born at Columbia, Pa., but had lived nearly all his life in Lancaster. A printer by profession,

for most of his business career he was connected with the firm of Steinman & Steinman, publishers of the Lancaster Intelligencer and one of those printing houses which by the technical excellence of their work and their moderate prices have done much to facilitate scientific publication. In 1924 he left them to join with Prof. Cattell in founding the Science Press Printing Co., an organization especially devoted to the efficient and economical handling of scientific work.

Botany and ornithology were Mr. Urban's pleasures and the objects of many holiday excursions, and he had collected and exchanged specimens of the Lancaster County flora more or less extensively.

The editors' heartiest thanks are offered to Mr. Robert A. Ware for his gift of five dollars to be used for the benefit of the JOURNAL.

I have received from our fellow member, Allan MacCaskill, Jr., several specimens of *Asplenium flabellifolium* and *Cheilanthes tenuifolia* collected in Victoria, Australia. I will send these to members of the Fern Society upon request as long as they last. Address E. J. Winslow, Auburndale, Mass.

New members:

Baker, H. R., Dept. of Botany, University of Delaware, Newark, Del.

Chubbuck, Mrs. Edwin J., 2922 Forest Ave., Berkeley, Cal.

Davis, William Anthony, West Barrington, R. I.

Dobbins, R. A., Ohio Northern University, Ada, Ohio.

Fedtschenko, Prof. Boris, Jardin Botanique Principal, Leningrad, Russia (U. S. S. R.).

Harrington, Mrs. Melvin H., 1016 Westview St., Mt. Airy P. O., Philadelphia, Pa.

Hobbs, Mrs. John E., 2933 Whitney Ave., Mt. Carmel, Conn.

Mrs. Frances Rayek, 5507 Mathews St., Germantown, Philadelphia, Pa.

Richardo, Charles, 71 Charles St., Toronto, Ontario, Canada.
Ross, Miss Marjorie Ruth, Pennsylvania State College, State College, Pa.
Smith, Ewart G., 147 High St., Christchurch, New Zealand.
Stetson, Richard N., Corcoran, Cal.

Changes of address:

Benedict, Dr. R. C., 1819 Dorchester Road, Brooklyn, N. Y.
Brown, Hubert H., 158 Glebeholm Blvd., Toronto, Canada, not Herbert H., as in the printed list of members.
Fay, Mrs. Dudley Ward, 63 South St., Auburn, N. Y., not Albany, as erroneously printed in the JOURNAL.
Horr, Mrs. Ella L., Edgell Road, Framingham, Mass.
Kittredge, Miss E. M., c/o Mrs. H. E. Heselton, Taftsville, Vt.
Lombard, Dr. Robert H., P. O. Box 293, Ashburnham, Mass.
McColl, W. R., 819 2nd Ave. East, Owen Sound, Ontario.
Perazzo, Mrs. Ethel, P. O. Box 514, Huntington Park, Cal.
Pugsley, Frank M., Pittsford, N. Y., not Vermont, as erroneously printed in the JOURNAL.

Our fellow member, Mr. E. H. Barnes, Taxation Dept., G. P. O. Building, Perth, West Australia, would like to obtain spores of the following ferns: *Dryopteris intermedia*, *D. marginalis*, *Lygodium palmatum*, and *Bommeria hispida*. He would also like seeds of *Claytonia caroliniana* and *Trientalis americana*. Can any of us supply his wants?

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Published by the

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EDITORS

R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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American Fern Journal

VOL. 17 JULY–SEPTEMBER, 1927 · No. 3

Ferns of the Davis Mountains, Western Texas

ERNEST J. PALMER

During the course of botanical explorations in Texas in 1926 I found opportunity to pay two brief visits to the Davis Mountains, near the extreme western part of the state. The flora of this region proved to be extremely interesting and rich in plants characteristic of Northern Mexico, many of which are rare and little known in the United States, and including a number that apparently have not been found previously north of the Rio Grande.

The Pteridophytes are well represented and abundant in many localities in the region and a rather complete collection of them was made. When the specimens were examined several surprising things were discovered, including one species (*Pellaea cordata*) not previously credited to the United States, and some others that are comparatively rare and limited within our national boundaries. A brief account of the species of this group collected in the Davis Mountains and in the piedmont area from Alpine to Ft. Davis may be of interest to readers of the FERN JOURNAL.

The complete list of the Ferns of Texas is yet to be compiled. In 1903 Mr. B. F. Bush[1] published a list of the species then known from the state, in which he

[1] Bush, B. F. A list of the Ferns of Texas. Bull. Torrey Bot. Club, XXX. 342–358 (1903).

[Volume 17, No. 2, of the JOURNAL, pages 37–76, plates 2 and 3, was issued June 18, 1927.]

enumerated 59 species and varieties, a few of which, however, would have to be discarded now, either because of later developments in the understanding of the species or because of some doubt as to their occurrence within the borders of Texas. In 1919 the writer contributed to the FERN JOURNAL[2] a list of species collected east of the 100th meridian, to which the following enumeration may be considered supplementary. Several of the names of the latter list should also be corrected to conform to present usage.

While the number of species of ferns to be found within a small area in most parts of Texas is much less than in many similar areas in some of the eastern states, the vast size of the "Empire State of the West" and its diversity in topography, soil, rainfall and other ecological factors is so great that it is probable that when its fern flora is fully known it may equal or exceed in variety that of any other state.

The Davis Mountains are situated in the southwestern part of the state, about 170 miles northeast of El Paso, and wholly within the borders of Jeff Davis County. They cover an area of something like 200 square miles and are more or less connected with other outlying groups on the eastern side of the Rocky Mountains. The altitude of the town of Ft. Davis, situated near the eastern foot-hills, is about 1,600 meters (5,250 feet) above sea-level at the Gulf of Mexico, and the highest peak (Mt. Livermore) reaches a height of 2,555 meters (8,382 feet) according to figures of the United States Geological Survey.

The rainfall is rather sparse, the annual average being about 25 inches, most of which is precipitated in the form of local showers or torrents during the summer and

[2] Palmer, Ernest J. AM. FERN JOURN., IX. 17, 50 and 81.

autumn months. Periods of several weeks or even months without rainfall often occur during parts of the year.

The topography of the area is quite varied, the rocky ridges and isolated peaks often arising precipitously from the plains at various levels. Many small streams have their sources in the higher mountains and find their way through steeply descending rocky gorges or canyons to the lower plains. Most of these streams are dry except after heavy rainfall, but some of them receive a more or less constant supply of water from springs along their courses and become perennial for short distances until the flow disappears again under beds of gravel or shingle.

The rocks are entirely igneous except at a few places along the borders of the area. They consist of syenites, rhyolites, basalt, etc., varying greatly in density and physical characters. The residual soil resulting from the effects of erosion upon these formations is somewhat acid in character. The deposits that have accumulated in the valleys, canyons and local depressions are usually very rocky and porous, but are sometimes enriched locally by vegetable humus in protected situations. On the steep slopes of many of the mountains the rocks are quite naked, and often along the bases of cliffs there are large accumulations of rubble and loose boulders.

In the more open parts of the plains and wider canyons as well as on the exposed mountain slopes the vegetation is largely xerophytic and often sparse. Mesquite, piñon, one or two species of oak, several cacti, yuccas, junipers and cat-claws are the most abundant larger plants. In the canyons and along the larger streams the flora is enriched by many other species, including *Pinus ponderosa* and several oaks; at the higher levels in canyons and on slopes *Pinus flexilis* var. *australis* grows with the other species and both attain a large size.

Most of the ferns, as will be seen by consulting the list, are such as grow amongst or in the crevices of rocks and are adapted to withstanding long periods of drought. The lip ferns, cloak ferns and cliff brakes are the most abundant both as to individuals and species. The two largest ferns, *Dryopteris Filix-mas* and *Pteridium aquilinum* var. *pubescens*, are restricted to the higher levels and grow only in a few favored spots where there is more abundant shade and moisture or accumulations of more fertile soil.

I wish to express my thanks to Dr. William R. Maxon of the National Herbarium and to Mr. C. A. Weatherby of the Gray Herbarium for assistance in determining some of the species and checking my determinations of others.

SELAGINELLACEAE

Selaginella mutica D. C. Eaton

Along crevices and clefts of porphyritic rocks and on steep slopes and faces of cliffs where there is considerable moisture for at least part of the season. This species is much less abundant than the next and was seen only in a few localities near the top of Mt. Livermore and Sawtooth Mountain, at altitudes above 2,000 meters.

Selaginella Sheldoni Maxon

Very abundant along rocky bluffs and ledges and amongst boulders and rubble affording some protection from erosion and conservation of moisture.

MARSILEACEAE

Marsilea uncinata A. Braun

In shallow water along a grassy spring-fed brook, U-up and U-down Ranch, Limpia canyon, about 14 miles northwest of Ft. Davis.

POLYPODIACEAE

Polypodium thyssanolepis A. Braun

Along crevices and ledges of cliffs where there is abundant shade and seepage water for most of the season. This interesting species, which ranges from Mexico to Peru and barely enters the United States in this area, was collected at two stations. Near Ft. Davis it was found along fissures and crevices of steep porphyry bluffs bordering Limpia canyon. The other station was on the Frank Jones Ranch, along the upper course of a branch of the Limpia, at an altitude of 1,850 meters. At the last place it was growing under the protection of an overhanging ledge of porphyritic rock, and along wet crevices. The largest fronds found here were about five or six centimeters long, and often where the moisture was less abundant they were reduced to single unlobed segments of oblong-lanceolate shape scarcely more than a centimeter in length.

Woodsia mexicana Fée

Abundant throughout the area along ledges and cliffs and about the margins of loose boulders.

Woodsia Plummerae Lemmon

Not so common as the last species but found at a number of places in more shaded and somewhat moister situations. At one locality near the base of Livermore peak many of the fronds were bifurcated at the apex.

Dryopteris Filix-mas (L.) Schott.

Found along the bases of cliffs, and in deep shaded ravines of the higher mountains. This fern, which is the largest species in the area, was observed only near the top of Sawtooth Mountain, along ravines leading up to Mt. Livermore and along the base of a high cliff on the north side of the latter mountain. It was abundant only at the last named place where it grows most luxuri-

antly amongst the rubble, some of the fronds being 6 to 8 decimeters long.

Asplenium resiliens Kunze

Rather abundant throughout the area, growing in partial shade along ledges and clefts and about the bases of detached boulders of porphyritic rock.

Asplenium Trichomanes Linnaeus

Found only at one place near the top of Mt. Livermore where it was growing sparingly along wet crevices of a north-facing cliff, with *Selaginella mutica* and *S. Sheldoni.*

Pellaea atropurpurea (L.) Link

Rather rare, but found in several localities along cliffs bordering canyons of mountain streams.

Pellaea Wrightiana Hooker

Frequent in partial shade along ledges and about the bases of large detached boulders.

Pellaea ternifolia (Cav.) Link

Rather frequent in similar situations to the last, and most abundant about the bases of large decomposing syenite boulders. The fronds are larger and stiffer than those of the last species, some of them measuring 25 to 30 cm. in length.

Pellaea cordata Cavanilles

This interesting Mexican fern, which does not appear to have been reported before from the United States, is rather abundant in the higher levels of the Davis Mountains. It is found growing amongst rubble or more frequently in the protection of overhanging cliffs and ledges. In the latter situations and where there is considerable moisture it is most luxuriant and the leaflets of the sterile fronds are quite large, sometimes measuring up to two centimeters in breadth. In drier places and especially when seen in the fruiting stage it has a

very different appearance, the leaflets being much narrower and reduced in size. The fronds are often 3 to 5 dm. tall and the new growth comes up amongst a mass of dead stipes.

Pellaea intermedia Mettenius var. *pubescens* Mettenius

Growing in somewhat drier situations than the last, which it apparently replaces at lower altitudes. Specimens were collected near Ft. Davis and along the rocky banks of Limpia canyon 12 or 15 miles northwest of that town.

Cheilanthes Wrightii Hooker

Rather frequent amongst rubble on open hillsides and banks of streams. This is the smallest of the ferns found in the area, the fronds with stipes seldom exceeding 5 cm. in height.

Cheilanthes Feei Moore

This species was collected at Ft. Davis and along the upper canyons of the mountains, but it is apparently uncommon. It grows in clefts and fissures of porphyritic rocks on comparatively dry and exposed faces of the cliffs.

Cheilanthes Eatoni Baker

Rather common throughout the area, growing in large tufts amongst rubble and about the bases of boulders, especially the coarse-grained rapidly decomposing elaeolite-syenite.

Cheilanthes tomentosa Link

This species which in habit resembles the one last named grows in similar situations but is apparently less common.

Cheilanthes Lindheimeri Hooker

This rather rare fern was collected amongst rubble and boulders about half way between Alpine and Ft. Davis and also on the side of Sawtooth Mountain, where it was

growing in rather dry situations along ledges in partial shade.

Cheilanthes Fendleri Hooker

Growing about the bases of boulders and in crevices of rocks where there is moisture for short periods only after rains. It is nowhere very common but was seen in several places throughout the area.

Cheilanthes Wootoni Maxon

This striking little fern was collected only once, between Alpine and Ft. Davis, but it probably occurs elsewhere in the area. It grows also in rather dry situations amongst the igneous rocks.

Cheilanthes castanea Maxon

This species, first described from Mexico, is rather abundant in the higher parts of the Davis Mountains. It grows in large colonies or groups along ledges of small bluffs and in crevices where there is some shade and moisture for considerable periods. In habit of growth it is well distinguished from the nearly allied species *C. Eatoni* and *C. tomentosa* by its generally smaller, more slender and more loosely tufted fronds which are not quite so pale or cinereous as those of the other species.

Cheilanthes villosa Davenport

This species was collected in a canyon near Ft. Davis. growing along shaded ledges of the syenite cliffs.

Notholaena sinuata (Sw.) Kaulf.

This species, which is also found in the limestone region of the Edwards Plateau, is rather common in the foot-hills and on the lower levels of the mountains, growing along dry rocky ledges and amongst boulders of the porphyritic rocks.

Notholaena sinuata var. *integerrima* Hooker

This was not observed in the Davis Mountains area, but was collected on low rocky hills arising from the

plains, between Ft. Stockton and Marathon. There it was growing about the bases of sandstone boulders amongst a flora of yuccas, cacti, scrub oak (*Quercus grisea*), mesquite and similar semi-desert plants.

Notholaena bonariensis (Willd.) C. Chr.

This is perhaps the commonest species of Notholaena in the Davis Mountain area. It grows in similar situations to the last species, which it resembles, but from which it is easily distinguished by its narrower and less coarsely toothed fronds.

Notholaena Hookeri D. C. Eaton

This handsome species, with its small deltoid ternate fronds, which are green above and white or pale yellow beneath, is often abundant on dry rocky ledges and about the bases of detached boulders. It is found in the foothills and in the mountains up to altitudes of about 2,000 meters.

Bommeria hispida (Mett.) Underwood

This species often grows with the last, which it somewhat resembles in the shape of the fronds, which are, however, smaller, pubescent above and green beneath.

Pteridium aquilinum (L.) Kuhn var. *pubescens* Underwood

This fern was observed only in canyons, at a level of about 2,200 meters, north of Mount Livermore. It was growing here in shaded or partially shaded situations, in alluvial soil along mountain streams.

WEBB CITY, MISSOURI

A Caribbean Cruise and some Jamaican Wayside Ferns—III

F. E. CORNE

Among the guests at the hotel was an English lady who, with her husband, frequently went driving with an intelligent old darky for driver (there are still more carriages and horses than automobiles in Jamaica), and often she brought me some treasure. Once it was a huge frond of *Dennstaedtia rubiginosa*, the ternate pinnae having a spread of 54 inches. The whole frond before the stem was cut must have stood four or five feet high. Another time it was a frond of *Alsophila* almost as large, also ternate, the thick texture of the upward rounding pinnae suggesting more a palm than a fern.

Others also brought wayside specimens from more distant counties—the Star of Bethlehem, *Hemionitis palmata*, the underside of the fertile leaves protected by delicate red-brown hairs; the two silver ferns, *Pityrogramma tartarea* and *P. calomelanos*; the gold ferns, *Pityrogramma sulphurea* and *P. chrysophylla*. In the lovely tropical garden of an American friend I found *Pteris serrulata*, *Nephrolepis pectinata*, *Dennstaedtia rubiginosa* and *Cheilanthes microphylla*, and in another garden a long belt of "Pepper Fern," *Dryopteris normalis*, which at one time had been mingled with silver fern, but all of that had been crowded out by the Pepper Fern.

I was also able through the kindness of a friend to purchase a collection of small ferns brought from the higher mountains to be used commercially for decorating candle-shades, handkerchief boxes, and the like. When covered with the thin inner bark of the lace tree, which resembles a fine net, these frail-looking objects are said to last a long time. In this collection were some of the filmies—*Hymenophyllum fucoides*, *H. splendens*, *Trichomanes accedens*, and *T. rigidum*—*Asplenium fragrans*, and several others.

Out driving one day, I noticed by the roadside a large patch of the Prince's Feather, first seen in the Kingston garden. We were on our way to the house of a wealthy native who kindly welcomes strangers wishing to enjoy the fine view from his windows. The approach to the house was most picturesque. Imagine a carriage road winding in and out between green hedges which are capped from time to time by crimson or yellow hibiscus blossoms, the roadbed itself of the most brilliant terra-cotta color, and, as it turns abruptly to the right, the pretty white bungalow appears, standing on a slight eminence to the left, while directly in front, seen through the trunks of cocoanut palms and feathery bamboos, rises a great rocky hill, misty in the loveliest shades of lavender, purple, and blue.

After spending some weeks at Mandeville, we went to Moneague in St. Ann's County. Moneague is a restful place—a plain surrounded by mountains in the near distance, with forests between. The dining veranda at the hotel here was, as usual, decorated with growing ferns. This time they were Nephrolepis of the "fish-tail" variety. A number of tubs fully two feet across were filled with dozens of fronds all of unusual length, and these had all at one time been brought from the neighboring woods. In a thicket on the way to the village I found *Blechnum occidentale*.

From Moneague we took the wonderfully beautiful drive to St. Ann's Bay, Ocho Rios, Roaring River Falls, and through the Fern Gully. The last is one of the wonders of the island and well worth coming a long distance to see. When driving, it comes upon one somewhat as a surprise—a turn, then a dip in the road, and suddenly one finds oneself in a wonderland of ferns. As one is requested to take no plants, I carried away only an unforgettable vision. On either side rose great, verdure-covered cliffs, seen through the slender trunks of bamboo or tree ferns. On the steep, narrow, shaded,

winding road lay splashes of sunshine; there came the occasional flash of a bird's wing; and everywhere, close at hand among the roadside stones, and as far as one can see, ferns, ferns, ferns, thousands upon thousands of them. Large boulders were capped with masses of maidenhair; nearby grew tall slender pinnate ferns 5 or 6 feet tall and others shorter and wider, beautiful, but to me unfamiliar. There are said to be between thirty and forty varieties of ferns in this wonderful place, from tree ferns to tiny filmies, but to find them one should walk a distance of perhaps three miles. More than once the Gully has been in danger of being ruined by vandals carrying away many plants and cutting down tall tree ferns (here called in the vernacular "ratta-drum"), because "no good" they said; and once it was nearly turned into a banana farm. But now it is protected by law and it is hoped that it may remain one of nature's beauty spots.

On leaving the Gully the road turns to the left and skirts the brilliant, many-hued waters of St. Ann's Bay, while on the left are still many fern-covered cliffs. By one of these we stopped, and in a few minutes I had gathered *Adiantum cuneatum*, *A. cristatum*, *A. tenerum*, and *A. melanoleucum*, *Dryopteris reptans*, and *Anemia hirsuta* with its tassel-like clusters of spore-cases. Doubtless I might have found still others, but my companions were growing impatient. Nearby a gate led down to St. Ann's bathing beach, where one may enjoy the unique experience of taking a plunge bath in the sea and at the same time a fresh water shower from the falls of Dunn River.

A little farther on we came to a gate leading through a field to the Roaring River Falls, the widest and by many thought to be the most beautiful of the many falls on this "island of streams." The rushing water falling from rock to rock made a much more musical sound than the name might imply. In the moist earth nearby were

THE FERN GULLY, ST. ANN'S COUNTY, JAMAICA

again many tall ferns, but all sterile and all too large for me to handle at that time.

In all, I brought home nearly seventy different species or varieties—which number, though only about one-seventh of all attributed to Jamaica, was fairly satisfactory considering that the woods were taboo and that I did not visit the higher mountains where the greater number grow.

But few of the Jamaican ferns seem to have English names and the only book on the subject I could find (Grisebach's *Flora of the British West Indies*), written in technical terms and not illustrated, was a puzzle for a non-technical fern student. I am therefore very grateful to Mr. Weatherby for aiding me with the Latin names.

Would it not be a delightful thing if some one with the ability and leisure—maybe a member of our Society—should write up these interesting plants in popular style? Such a book would doubtless be welcomed by many English residents of the island as well as by tourists.

"Ferns, beautiful ferns,
By the side of the running waters,
Lovely and sweet and fresh,
The fairest of earth-born daughters;
Under the dreamy shade
Of the forest's mighty branches
Curving their graceful shapes
To the playful wind's advances."

"Ferns, feathery ferns,
Delicate, slender and frail,
Nursed by the streamlet, whose song
Is music for hillside and vale.
Purity, modesty, grace,
Emblems of these to the mind,
Loving the quietest place
That ever a sunbeam will find."

CAMBRIDGE, MASS.

A New Polypodium from Mexico

C. A. Weatherby

Some time ago Rev. George L. Moxley sent to the Gray Herbarium and the United States National Herbarium duplicate sets of a small collection of ferns made by John Spence near Cordoba, State of Vera Cruz, Mexico, about the year 1908. Spence was a coffee-planter who somehow became interested in ferns. His collection was sent first to the late Dr. Lorenzo G. Yates, of Santa Barbara, California, who seems never to have done anything with it. After his death it came into Mr. Moxley's hands and was made available for study. Although obviously the work of an inexperienced herborizer and taken in a region previously visited by many botanists, it contains several items of interest. Among them is a little *Polypodium*, which I at first regarded as a lobed form of *P. astrolepis*, a rather common species in the West Indies and the tropical portions of Central America, southern Mexico, and northern South America. Dr. Maxon, however, was at the time inclined to consider it a new species; and later collections of it in the same general region by Purpus and Fisher (kindly communicated to me by Dr. Maxon) apparently show that he was right and that the plant, though presumably a local off-shoot of *P. astrolepis* and separated from it by rather slight characters, holds these characters well and should be regarded as an established species. It is accordingly, with Dr. Maxon's assent, here proposed as

Polypodium sordidulum Maxon & Weatherby. Rhizome creeping, slender, branched, densely beset with closely appressed, orbicular or broadly elliptic, blackish scales 0.5 mm. or less in their longest diameter, each bearing at its center a cluster of several erect,

slender, brown, more or less moniliform trichomes about 0.5 mm. long, which give the rootstock the appearance of being tomentose; cells of the scales few, proportionally large, in two or three concentric series, with heavy black walls and rather large lumina, subquadrate; fronds 2.5–8 cm. long, jointed to the rhizome; stipes 0.5–1.5 cm. long or nearly obsolete, much shorter than the lamina, narrowly green-winged, sparsely scaly, nearly terete; blades lanceolate or more rarely ovate, 2.5–6.5 cm. long (generally 4–6 cm.), 0.8–1.5 cm. broad (generally about 1 cm.), broadest below the middle, at base gradually or somewhat abruptly narrowed into the stipe, acute at apex, more or less deeply pinnatifid into 4–9 pairs of deltoid-ovate or oblong, obtuse, ascending lobes, toward the apex merely crenate-dentate, coriaceous, the margins not cartilaginous-thickened; upper surface sparsely beset with small, orbicular, stellate-laciniate scales 0.3–0.5 mm. in diameter, their cells proportionately large, subquadrate, with thick, brown walls; lower surface more densely beset with similar scales and with larger brown ones 0.7–0.8 mm. long and ovate-lanceolate from a peltate base; veins immersed; venation in occasional broader, less pinnatifid blades of a simple pleopeltid type, in the larger and more deeply pinnatifid blades the costal areoles obsolete, one prominent vein running into each lobe, there 1–3-forked, the branches united toward their apices to form 1–3 irregular areoles; sori large, one to each fertile lobe, circular or broadly oval, bearing among the sporangia deciduous, fuscous scales which are usually ovate and with lacerate margins; sporangia pyriform with long and very slender stipes; spores ovoid, smooth, yellowish.[1]—MEXICO, STATE OF VERA CRUZ: epiphytic on coffee trees near Cordoba, about 1908, *John Spence*, no. 114 (TYPE in Gray Herb., isotype in U. S. Nat. Herb.); Zacuapan, Jan., 1912, *Purpus*, no. 5798 (Nat. Herb.; Herb. Univ. California); Rio Blanco, alt. 4800 ft., Aug. 14, 1926, *G. L. Fisher*, no. 37 (Nat. Herb.; Gray Herb.).

[1] **Polypodium sordidulum** Maxon & Weatherby, n. sp., caracteribus rhizomatis, palearum, etc. *P. astrolepidi* simillimum, quo differt stipitibus subteretibus, laminis pinnatifidis, lobis 4–9-jugis deltoideo-ovatis-oblongis obtusis adscendentibus, soris orbiculatis.

Polypodium sordidulum Maxon & Weatherby

Explanation of Figures. 1. Habital sketch of part of plant, × 1. 2. Two lobes enlarged to show venation, × 3. 3. Portion of rootstock with most of scales removed, two left in place to show clusters of trichomes, × 10.

In spite of its apparently simpler venation, this curious little species is, as noted above, closely related to *P. astrolepis*, with which it agrees in all technical characters of rootstock, scales, etc., and from which it is hardly to be separated save by its consistently lobed fronds, its scarcely flattened stipe, and its round sori. The apparent difference in venation is to be correlated with the lobing. As Mettenius has pointed out, the pleopeltid type of venation results from the lowest branch of each primary vein on the upper side becoming directed downward, parallel to the costa, until it meets the next vein above, the exterior areoles being formed by the variously united upper branches of the vein and veinlets. In *P. sordidulum* a perfect, though simple, pleopeltid venation is to be found in occasional broad slightly lobed fronds. In fronds not very deeply lobed, the lower branches of the primary veins on their upper sides have become much more oblique to the costa and the costal areoles are therefore also oblique almost after the fashion of the section *Goniophlebium*, though the outer areoles are not at all of that type. In the narrow, deeply pinnatifid fronds which are chiefly characteristic of the species, these branches have become still more oblique and are altogether cut off from the adjacent primary veins by the sinuses between the lobes, the upper branches, however, remaining still united into one or more areoles within the lobe. Were the lobes sufficiently developed, the primary vein would doubtless become the costa of each and the branches form a secondary pleopeltid venation along it.

In one blade examined the costal areoles are absent toward the base where the lobes are large and above are present and perfectly formed on one side of the costa and absent on the other, the basal branches there, instead of going to meet the next primary vein, turning upward into the lobe.

GRAY HERBARIUM, HARVARD UNIVERSITY

Distribution of the Hart's Tongue

E. W. GRAVES

The discussion by Dr. Waters and Dr. Benedict on the distributing of the hart's tongue aroused my interest. I feel quite in accord with the expressed opinions of Dr. Waters in respect to the careless distribution of any and all kinds of plants, for it takes the spice out of life to go botanizing in a region and to find that someone has introduced alien plants into it. Also it cuts off the need of scientific collecting.

But with the hart's tongue it seems to me it is quite different. I do not think Dr. Waters need fear that its range will be extended. I dare say that, outside of New York State, where conditions seem to favor its propagation, in five years' time there will not be a single plant growing that has been set out in the wild. For ages in the past the hart's tongue has had the chance of extending its range throughout eastern America, and yet it clings to a strip of country running through central and western New York and eastern Ontario. It has, however, found a lodging place six hundred miles away in Tennessee, in two places. But what about all that intervening territory? Why has it not established itself in some of the limestone districts in Pennsylvania, or Kentucky? What is the matter with the limestone outcrops of Vermont, Massachusetts, and Ohio? It is true that at one time it was reported near Louisville, Kentucky, but Williamson and later botanists were not able to substantiate that claim.

I remember a few years ago while exploring the South Pittsburg station, after I had examined the sinkhole where it grows, I went to the ravine near and searched many of the limestone outcroppings, where moisture and

rich soil and other conditions seemed to meet the requirements for the growth of the hart's tongue. My searches up and down the ravine revealed no signs of plants. Others who had explored the locality report the same experience. But at Post Oak Springs, eighty miles away, a few plants have been found. Why should it travel so far to establish another station? This is a question for some one to unravel.

In Iowa *Dryopteris marginalis* acts very much like the hart's tongue. In Allamakee County in the northeastern part of the state is one station; then 175 miles to the southwest in Hardin County there are two stations, one large one where it grows plentifully at Steamboat Rock on the Iowa River, and another smaller one down the river at Eldora. Prof. L. H. Pammel, head of the department of botany at Ames, who has been in almost every county in the state, says it grows nowhere else in Iowa. It jumps again to the Ozarks in Missouri, where it is plentiful. In my explorations of southeastern Iowa I found a place in Muscatine County where environment seemed to offer an exceptionally good habitat. On the carbonate sandstone *Dryopteris Goldiana* and *D. spinulosa* are growing in profusion, and while looking over the place I expected to find *D. marginalis*, but I did not. Why did it jump such an inviting place and find a lodging hundreds of miles to the south in Missouri? Muscatine County is on the Mississippi River, right in the line of bird migration, where undoubtedly spores have been carried. Like the tricks of the hart's tongue, this is very queer.

Mr. Druery, the English botanist, says the hart's tongue is common in England, but rare in Scotland, and remarks that its comparative rarity in Scotland is the more unexpected, as there are so many damp, rocky glens there that would make an ideal habitat for it. Mr.

Druery is inclined to believe that its absence in certain sections is caused by minute insects that prey upon the prothallia or the spores. That may be responsible for its absence in so many of the limestone districts in the United States. Whatever it is, it may cause the hart's tongue to disappear entirely from the American continent. It grows no more at many of its former stations. It is not found any longer at Post Oak Springs, Tennessee. Ten years ago, on my last trip to South Pittsburg, I counted only fifty plants where Dr. Maxon had reported two hundred only a few years before. It seems to have disappeared from several of the locations where it formerly grew in New York. The East Jamesville station is passing away. Unless it takes kindly to its new station in the State Park, it may pass forever from America as civilization advances.

BENTONSPORT, IOWA

The Oropi Bush, Tauranga, New Zealand

H. B. DOBBIE

At 8:45 A. M. "Ernie" (I never heard his surname) called for me in a serviceable Rugby motor-car. We then picked up Mr. Cameron and "Alec," also a well-filled hamper. For the first twelve miles or so the road was good and we spun along at a fine rate past the Gate Pa, where the British suffered a severe defeat at the hands of the Maoris some sixty or seventy years ago. The country looked green and prosperous, lush grass with a few crops of maize, the rich, sandy earth having benefitted by recent heavy rains. Tauranga is famous for trees—horse chestnut, poplar, elm, oak, etc.—and, to judge by some of the plants, the soil must be very rich. I found the leaves of the puka and whau four times as large as at Auckland and further north. A Scotch thistle which I dug up in a Tauranga garden covered a space of fifteen feet in circumference, with a stalk four inches through and no less than one thousand flower buds —I counted them.

To return to our journey. The road rose steadily until we were up several hundred feet, and then it began to deteriorate. The way Ernie steered his car among the terrible ruts was marvelous. His strong, pleasant face had inspired confidence at the start, and the finish fully justified my trust. Once only had we to be dug out, and then it did not delay us five minutes.

As we rose higher, the undulating hills, orange brown with a dense growth of bracken (*Pteris esculenta*), became interspersed with bush which filled all the deeper gullies, but we did not actually pass through it until, turning into a side road, we descended a bad hill winding round deep cuttings and over a corduroy track made

of small tree-trunks. Then Mr. Cameron called a halt. After a light meal we plunged into the bush—and there is no forest in all the world like that of New Zealand. The floor was covered with great crowns of the sword fern (*Lomaria discolor*), beautiful feathery tufts of crape fern (*Todea hymenophylloides*), sometimes raised on stems several inches high, tangles of the umbrella fern (*Gleichenia Cunninghamii*), the fronds sometimes two feet wide, the great trees, often two hundred feet high, subduing the light of the sun which blazed outside. Here and there the giants of the forest were lying prone, but instead of being a disfigurement they added fresh beauties to the scene, the mouldering trunks being hidden under carpets of filmy ferns and moss; and everywhere were tall, graceful tree ferns.

Mr. Cameron had promised to find several ferns of which I wanted specimens to send to my friends. It was here we came to the first, *Asplenium tripinnatum*, a somewhat scarce plant, and I reciprocated by pointing out some of the smaller filmy ferns (*Hymenophyllum flabellatum*, *tunbridgense*, and *multifidum*) and *Asplenium umbrosum*, which he had overlooked. After Alec and Ernie had bagged a number of small trees—they were also keen about the ferns—we mounted the car, recrossed the corduroy track, and entered another patch of bush, nearly encircled by a rushing stream of limpid water. Here the billy was put on to boil and we had a substantial lunch. The tree ferns, with an endless variety of herbaceous species on their trunks and upon the sward, made a charming setting to our dining-room.

The most prominent of the tree ferns is the weki-ponga (*Dicksonia fibrosa*), its plume-like head giving it an almost majestic appearance.

Our next spin in the car took us over the most appalling road, the sides of the deep cuttings being festooned

with great sweeping fronds of the palm-leaf fern (*Lomaria capensis*), the young leaves painted a vivid rose-pink. We pulled up at a settler's house, and Mrs. Rodgers very kindly offered to pilot us to a waterfall. After crossing some paddocks, still encumbered with the burnt stumps of the forest that had covered the land a few years before, Mr. Cameron made a new find, *Hypolepis Petricana*, much larger than usual and looking very handsome on its slim black stalks. Then we reached a point whence we could peep over a dizzy precipice at the waterfall thundering into a deep pool far below. Following up the gorge the bush became simply entrancing; mangi-mangi, the climbing fern (*Lygodium articulatum*), acres of kidney fern (*Trichomanes reniforme*), covering the steep banks with tender green pellucid cups, or nestling in cushions of lovely emerald moss; great patches of dainty *Lindsaya* (*trichomanoides*); glistening fronds of *Asplenium* (*lucidum, falcatum, bulbiferum*), and many others too numerous to mention.

It was here Mr. Cameron showed me many fine specimens of *Davallia Novae-Zealandiae*, a fern that I had not seen for many years. In return I showed him *Polypodium punctatum*, with its hairy red-brown stalks and spreading fronds.

But we still had to see the "pièce de résistance," *Lindsaya viridis*, and Mr. Cameron, who is a veritable tiger in the bush, would not let me miss anything. After clawing along the broken bank of the river, where the slippery rocks sloped steeply, he espied it on the further side. Without a pause he made himself a pole and leaped from boulder to boulder until he reached the further bank, his exclamation of rapture telling me he had made no mistake. Then, plunging recklessly into the torrent, he hoisted me on his back and carried me across, and I was soon lost in admiration before a great

flat rock covered with a mantle of this dainty fern of the most vivid green imaginable, slim, cinnamon-colored stalks, and ranging from six to twelve inches high. Meanwhile Alec had been carried across. I believe Mr. Cameron, in his superabundant energy, would have tackled Ernie, a big, heavy man twice his size. Perhaps it was fortunate that Ernie had gone back to look after the car for we had no accident on the excursion.

LEFT TO RIGHT: MR. CAMERON, THE AUTHOR, "ALEC," AND "ERNIE."

We arrived at Tauranga by 6:00 P. M. after one of the most enjoyable days that I can recall. Mr. Cameron fulfilled all his promises, and I was able to name some of the ferns about which he was doubtful. The excitement of seeing so many and such beautiful ferns prevented my getting tired. I had counted no less than fifty-five species, and no doubt there were several that I missed, so that the Oropi bush is unusually rich in these beautiful plants.

AUCKLAND, NEW ZEALAND

A Little Fern Garden in Ohio

BERNICE R. LAUGHLIN

Many nature-loving friends have followed the winding path of stepping stones to see for the first time our rarest fern, the Hart's-tongue (*Scolopendrium vulgare*), back in our little fern nook under the big sweet gum tree where the spice bushes help to make it shady and cool and the marginal (*Aspidium marginale*) and spinulose shield ferns (*Aspidium spinulosum*) filter the light rays over them. Here the three specimens of Hart's-tongue so kindly sent me by Mr. Ransier have found a home and, I hope, an abiding place forever. Just above them on some rock is the walking fern (*Camptosorus rhizophyllus*), while around are ebony spleenworts (*Asplenium platyneuron*), violets, hepaticas, orchids, and lady slippers to keep them company. Here, too, the common polypody (*Polypodium vulgare*) is making a brave effort to become naturalized both among and on some rocks, while nearby the beech ferns (*Phegopteris polypodiodes*), obtuse Woodsia (*Woodsia obtusa*), and several of the Botrychiums seem at home. Farther on, the persimmon trees, the horse chestnut, tulip-tree, wild cherry, maple and white birch, big old trees, make a shaded north side yard. Here among these trees we have planted native shrubs of dogwood, redbud, shadbush, wahoo, sassafras and spice bush. These make a fitting setting for our fern and wild flower sanctuary which is a never-failing source of joy throughout the season.

In earliest spring we find the first delicate, uncoiling fronds of the fragile bladder fern (*Cystopteris fragilis*), snow trillium and hepatica, to be followed later by the bold fiddle heads of cinnamon fern (*Osmunda cinna-*

momea) and all the other ferns, some thirty-four kinds, and the hosts of wild flowers.

The different kinds of ferns have been placed as near as possible in natural surroundings, and though lacking a swamp a large bed of Osmundas, including the cinnamon, interrupted, and royal ferns, are happy in a shady bed by the house where the wild ginger makes a beautiful ground cover. In a bed under the dogwood and wahoo, and among violets and hepaticas the ebony spleenworts and bulblet-bladder ferns (*Cystopteris bulbifera*) are thriving, and clumps of maiden-hair (*Adiantum pedatum*) raise lacy umbrellas to sway in the breeze, while lady ferns (*Athyrium filix-foemina*) and silvery spleenworts (*Athyrium thelypteroides*) stand guard in the background. Here and there the bed is punctuated with question marks of giant solomon seals, and in the shadow of the lady ferns are a few plants of the Adder's-tongue (*Ophioglossum vulgatum*) that we have hopes of making at home. The dainty little oak fern is the latest addition to this bed.

Though there is no marsh, the marsh fern (*Aspidium thelypteris*) is making a brave show in a moist place in company with the narrow-leaved spleenwort (*Asplenium angustifolium*). The New York fern (*Aspidium Noveboracense*) is trying to establish itself in a more open place, and among the rocks in a sunny spot the rusty Woodsia (*Woodsia ilvensis*) keeps tryst with the Harebells.

As the season has advanced the scenes have changed, but have been ever pleasing. When some cold night Jack Frost comes he takes the last of the wild asters and the stately ostrich ferns (*Struthiopteris Germanica*) are laid low, a lovely mass of cinnamon brown. Only the dark brown fertile fronds are standing to mark the place where once they stood three feet tall under the white

birch trees, and though the fern bed is drifted deep in leaves for its winter sleep, it yet holds a charm for us. Now large clumps of Christmas ferns (*Polystichum acrostichoides*) with their dark green sword-like fronds stand out against the tree trunks, contrasting beautifully with the white china-like berries of the baneberry and red ones of the spikenards. The spinulose shield fern, *Aspidium spinulosum intermedium*, with its rich, lacy fronds standing above the brown, fallen leaves, seem to be even more beautiful than earlier, if that is possible, for it belongs to a group which is undaunted by the coming winter.

We find when we look at the wahoo bush that Jack Frost has stopped for a moment here too and touched with his magic wand the quaint little four-cornered boxes hanging there, just waiting for him to open and expose the bright red berries within. As they dangle there among the leaves, looking for all the world like jeweled ear drops, they add their touch of color to the shifting scenes with the yellow glow of sassafras and red of dogwood, keeping in tune with all of nature's harmonies.

DELAWARE, OHIO

Recent Fern Literature

Dr. Britton, who has done much exploration in Porto Rico, has written a brief account of the tree ferns of that island. Twelve species are known. They are among the most beautiful natural features of the island, but for the most part can be seen in their full glory only in the higher mountains where there are no roads and one must walk or go on horseback. There are, however, various points on the mountain roads and one near Bar-

ranquitas, about two hours' drive from San Juan, where tree ferns may be found in more or less abundance. A dwarf species, *Cyathea dryopteroides* Maxon, peculiar to Porto Rico, is described and illustrated.[1]

Mr. H. S. Thompson has described an extraordinary freak of the European bracken. In a narrow and deeply shaded glen in England he found a plant of it, which, apparently in its search for light, had transformed itself into something very like a vine. The stem was over ten feet long, weak and leaning on other plants. It had nine pairs of pinnae, none of which bore pinnules over 2¾ inches long and were therefore very narrow, but attained as much as two feet in length. Many of the internodes between pinnules were three inches long.[2]

In the course of ecological studies of the long-leaf pine flats of Louisiana, Dr. Aravilla M. Taylor notes an unusual fern habitat. On piles of old brick, left when the kilns were abandoned, were found, in thriving condition, *Asplenium platyneuron*, *Osmunda regalis*, and *Drypoteris normalis*. *Pteris serrulata* has been several times reported on brick and stone walls in the South and *Adiantum Capillus-Veneris* at least once (see this JOURNAL **13**: 17, 1923), and in a region where there are no rocks ebony spleenwort might naturally take to bricks as a substitute; but the occurrence of *Osmunda regalis* in such a situation seems strange to a northern fern-hunter.[3]

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[1] Britton, N. L. Tree-ferns in Porto Rico. Journ. N. Y. Bot. Gard. **27**: 88–90, 1 fig. 1926.

[2] Thompson, H. S. A remarkably monstrous Brake Fern. Journ. Bot. **64**: 281–282. 1926.

[3] Taylor, Aravilla M. Some Ecological Habitats in the Long-leaf Pine Flats of Louisiana. Bull. Torr. Bot. Club **54**: 155–172. 3 figs. 1927.

Mr. Henry Mousley continues to report entertainingly his experiences in the field in Canada, with birds, ferns, orchids, and butterflies. Since moving to Montreal, he has been investigating Mt. Royal and in spite of the fact that it is within the city and visited and tramped over by thousands of people, he has found there an orchid new to North America and *Botrychium simplex*, reported but once before from Montreal—a good example of what intensive observation of even a supposedly well-known and unpromising area can accomplish in the way of "finds."[4]

Dr. Maxon, who is preparing a fern flora of Jamaica, spent some months in botanical exploration there last year, and has published an interesting report of his work. Although Jamaican ferns were among the first to be described from the New World and the island has been visited by hosts of collectors, its higher mountains are so difficult of access that many parts of them remain largely unknown. Dr. Maxon concentrated his efforts principally on two such areas—the vicinity of Cuna Cuna, sometimes suggestively called "Back of Beyond," and that of Portland Gap. Both proved very productive and many rare and little-known ferns were collected in quantity.[5]

Two other members of the Society in the government service at Washington were also engaged in general botanical exploration in the tropics. Mr. Paul C. Standley worked at Barro Colorado Island in Panama, an

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[4] Mousley, H. Notes on the Birds, Orchids, Ferns, and Butterflies of Mount Royal, Montreal, 1925–1926. Canad. Field Naturalist **40**: 181–183. **1926.**

[5] Maxon, W. R. Exploring for Ferns in the Blue Mountains of Jamaica. Smithsonian Miscellaneous Collections **78**: 100–111. **Figs. 110–118. 1927.**

article on the ferns of which he has lately published in this JOURNAL, and in Costa Rica, and Mr. E. C. Leonard continued his field-work in Haiti. Both have reported on their activities in the same number of the Smithsonian Miscellaneous Collections with Dr. Maxon.

Prof. Pickett and Mr. Thayer have studied and described in detail the development of the prothallium in *Polypodium vulgare*, var. *occidentale* (*P. falcatum*) and in *Pellaea densa*. The prothallia of the former showed considerable power of resistance to drought, remaining alive without water from July 15 to about October 1. In both species, sporophytes were produced in the normal sexual manner, in *Pellaea densa* even when attempts were made to induce asexual production. This is noteworthy since all of the nine species of *Pellaea*, which have been investigated have shown apogamous production; it tends to support the action of Diels and Maxon in transferring *P. densa* to other genera.[6]

Descriptions in current manuals state that the number of fertile pinnae in the interrupted fern is from 2 to 5. In a recent count made from 609 fronds growing near Hanover, N. H., Dr. N. M. Grier found that the variation in number ran from ½ a pair to 7½ pairs and that three was the commonest number, occurring in 24 per cent. of the fronds observed.[7]

Readers of the JOURNAL may recall that some time ago we noted the appearance in Hawaii of a destructive fern

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[6] Pickett, F. L., and Lewis Thayer. The Gametophytic Development of certain Ferns: Polypodium vulgare var. occidentale and Pellaea densa. Bull. Torr. Bot. Club **54**: 249–255. Pls. 15–17. 1927.

[7] Grier, N. M. A Note on the Interrupted Fern. Torreya **27**: 8–9. 1927.

pest, the Australian fern weevil, *Syagrius fulvitarsis* Pasc. This foreign bug has made itself very much at home in the Hawaiian forests and has developed such a particular appetite for ferns of the genus *Sadleria*, a group almost confined to the islands, as to threaten their extinction, at least in the island of Hawaii. Since their destruction, along with that of other species attacked, would remove much of the covering of the forest floor and seriously affect water conservation, the ravages of the weevil have aroused apprehension. Search in Australia has turned up an effective insect parasite, which has been successfully introduced in Hawaii and is very considerably checking the damage done by the weevil. It is a question, however, whether *Sadleria* will be able to reassert itself.

THE REPORT OF THELYPTERIS SIMULATA IN WEST VIRGINIA ERRONEOUS.—On the strength of a letter from Mr. Maurice Brooks, the occurrence of *Thelypteris simulata* in West Virginia was reported in the JOURNAL for the first quarter of this year, vol. 17, p. 26. Mr. Brooks now writes to say that, though the plant in question was at first so determined, further study shows it to be a somewhat unusual shade form of the marsh fern. It is due to Mr. Brooks to add that the publication of his report at that time was perhaps due to editorial misunderstanding of his intention.

FERN HUNTING IN ITALY.—In a letter dated January 13, 1927, Prof. Breckenridge writes of a tramp in the hills above Sorrento and has forwarded three interesting leaves of *Polypodium vulgare*. One of them is over twenty inches long, with a blade eight inches wide and

twelve long. Another, not quite so long, has one basal pinna or lobe redivided, pinnatifid nearly to its own midvein. All three are heavily fruited and in all the lobes are very slender and attenuate, very different from the common type of our native rocks.

American Fern Society

Dr. Frank Hall Knowlton, a member of the Society since 1912, died at Washington, D. C., November 22, 1926. He was born at Brandon, Vermont, September 2, 1860, and educated at Middlebury College, under Ezra Brainerd and Henry M. Seely. His earliest interests were in ornithology and botany and he retained them to the end. He did much botanical work for the Century, Standard, and Webster's Dictionaries and for the Jewish Encyclopedia; he founded *The Plant World* in 1897 and for seven years was its editor; and he published, in 1907, an excellent work on "Birds of the World." His professional work, however, was in paleobotany. He joined the staff of the United States National Museum in 1884, on his graduation from college, and remained with it for the rest of his life. Although his health was never robust, he accomplished a great deal, examining and reporting on hundreds of collections of fossil plants sent in to the Museum. He found time also for non-technical accounts of important developments in his special field—witness his happily written article on "Seed-bearing Ferns" in this JOURNAL (**5**: 83–88). Shortly before his death he had completed the manuscript of a general exposition of fossil botany, lately published. And, in the midst of all his industry, "he was never too busy or too ill to counsel and help his colleagues."

New members:

Dawes, Miss Emily M., Marlboro, N. H.

Duncan, Robert, 136 Woodland Road, Chestnut Hill, Mass.

Jones, Rodney Wilcox, 100 Broadview Ave., New Rochelle, N. Y.

Kümmerle, Dr. J. B., Budapest V, Akademia Utca 2, Hungary.

Marsh, Spencer S., National Newark & Essex Banking Co., Newark, N. J.

Marsh, Mrs. Spencer S., National Newark & Essex Banking Co., Newark, N. J.

May, Dr. James V., Rooms 1 and 2, First National Bank Building, Mariette, Wis.

Wilkens, Hans, 241 So. 11th St., Reading, Pa.

Changes of address:

Cook, Mrs. Helen Newman, 201 Longwood Road, Roland Park, Baltimore, Md.

Pond, Bremer W., 250 Stuart St., Boston, Mass.

Prof. Boris Fedtschenko, Chief of the Herbarium at the Principal Botanical Garden, Leningrad, U. S. S. R. (Russia), who has recently joined the Society, would like to exchange Russian and central-Asiatic ferns and fern-allies for North, Central, and South American ferns and fern-allies.

I have several fronds of *Trichomanes reniforme* from New Zealand, kindly sent for the purpose by Mr. H. B. Dobbie, which I will distribute to members on application as long as they last.—*C. A. Weatherby, 11 Wells Ave., East Hartford, Conn.*

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Published by the

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R. C. BENEDICT

E. J. WINSLOW C. A. WEATHERBY

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MACROSPORES OF ISOETES SINENSIS T. C. PALMER

American Fern Journal

Vol. 17 OCTOBER–DECEMBER, 1927 No. 4

A Chinese Isoetes

T. Chalkley Palmer

In November of 1924 Dr. W. R. Maxon sent me for identification a series of specimens of an *Isoetes* from China. An examination seemed to indicate an undescribed species. The only record of *Isoetes* from China known to me is that of *I. hypsophila* Handel-Mazetti, a citation for which I am also indebted to Dr. Maxon. The diagnosis[1] of this species was found to be something short of adequate, and Dr. Maxon was kind enough to procure the loan of some type material from the learned author. Unfortunately, this material consisted only of a few

[1] ***Isoetes Hypsophila*** **Handel-Mazetti.**

Sect. *Cristatae*. Pfeiffer.

Cormus trisulcatus 5–7 mm. crassus. Folia (4) 6–10, 5–13 c.m. lg. laete viridia flaccida vagina 4.–4.5 mm. sursum secus laminam in apicem tenuem sensim attenuatam producta lacunis magnis diaphragmatibus 1–2 mm. distantibus sparsis. Sporangia ellipsoidea vel globosa usque ad 2. mm. lg. Ligula subcordato-ovata saepe transverse latior 1 mm. lg. acutiuscula vel obtusa. Velum deest. Macrosporae levissimae ca. 320 μ diam. siccae albidae. Microsporae leves irregulariter globosae 15–18 μ diam.

Prov. Yunnan bor. occid. In montium ad septentr. urbis Lidjiang (Likiang) sitorum regione frigide temperata in lacunis turfi infra pratum Mahaidse in via Yungning ducente submersa 27°–30′ substra. calceo, ca. 3600. m. legi 13. vii. 1915. (N 1036.)

Anzeiger Acad. Wiss. Wien. No. 13, p. 95. 1923.

[Volume 17, number 3, of the Journal, pages 77–110, plates 4 and 5, was issued Sept. 8, 1927.]

plants showing every evidence of immaturity, and lacking some features essential to real comparison.

The specimens submitted by Dr. Maxon, collected near Nanking in a lake bottom June 9, 1922, bear the number of A. N. Steward No. 2153. A little later, through the courtesy of Dr. W. H. Brown, Director of the Bureau of Science, Manila, P. I., I received two sheets of *Isoetes* labelled as follows:

1. E. D. Merrill No. 11362. Ming tomb, bottom of dried out pond among sedges and grasses. Near Nanking, June 9, 1922. Coll. E. M.

2. A. N. Steward No. 2153. Spirit Valley, lake bottom, Nanking Province, June 9, 1922. All these, therefore, are of the same gathering, and all the specimens are found to be of the same type. The form so amply represented I would describe as follows:—

Isoetes **Sinensis** Sp. Nov.

Corm trilobate. Leaves numerous, light green, 15-25 c.m. long, attenuate, with many thick diaphragms across the lacunae; membranaceous borders near base 2. m.m. wide, disappearing 15. m.m above sporangium; four strong peripheral bast bundles; stomata numerous, especially above. Ligule cordate-acuminate, thick, 2. m.m. long, 1.5 m.m. broad. Velum none. Sporangium ellipsodial, often 9. m.m long, 3. m.m. broad, general surface white, with a complete peripheral band, 300 μ wide, of dense, dark-brown cells. Megaspores white, globose, 330–462 μ (average 400 μ) diameter, commissural and equatorial ridges thin, high, corrugate, intervening faces thickly set with high, stout, blunt or crested columns, more or less confluent into crested ridges, especially below. Microspores gray, gibbous in side view, alate, densely spinulose, 26–30 μ long.

Type Material.

A. N. Steward. No. 2153. June 9, 1922. Nanking, China. (U. S. National Museum No. 1170941.)

A. N. Steward. No. 2153. Herbarium Bureau of Science, Manila, P. I.

E. D. Merrill. No. 11362. Herbarium Bureau of Science, Manila, P. I.

A. N. Steward. No. 2153. Herb. Acad. Nat. Sci. Philadelphia.

Handel-Mazetti says of his *I. hypsophila*: "Proxima I. Drummondii habitu congruens sporis maioribus tuberculatis differt aliaeque affines Australienses longius distant."

The present species differs from *I. Drummondii* pronouncedly in the sculpture of the megaspores, the smaller, densely spinulose, gray microspores, the four strong bast bundles and the arrangement of the dark-brown cells of the sporangium in a sharply defined peripheral band. This last feature probably is unique in the genus. *I. coromandelina* of India has much larger and differently sculptured megaspores, and smooth microspores. As to *I. hypsophila*, diagnosis and specimens being alike inadequate, relationships must remain uncertain pending collection of additional material in intermediate and adjacent regions.

For the photograph of megaspores, showing an approximate enlargement of 28 diameters, I am indebted to the perseverance and rare skill of Dr. Thomas S. Stewart, of Philadelphia.

ACADEMY OF NATURAL SCIENCES,
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A New Colony of Botrychium obliquum in Iowa

E. W. GRAVES

Since writing the report of finding the new station of *Botrychium dissectum* in Van Buren County, Iowa, recorded in an earlier number of the JOURNAL, I have been

searching the woods for more Botrychiums. Early in November my seach was rewarded with finding a large colony of *Botrychium obliquum* less than two miles from where I found *B. dissectum*.

One day my son and I took a stroll to the colony of *B. dissectum*, which is about three fourths of a mile from my home. Then, thinking we would search the woods beyond and perhaps we might find more Botrychiums, we looked in the most likely places where one would expect to find them, choosing low, shady woods. Finally we came to a large creek with wide bottom land of rich, sandy loam. "This is the place of all others where Botrychiums should be found," said I to my son. "Keep a close watchout." The soil at this place is called by the United States Soil Survey Clinton silt loam. The station of *B. dissectum* is on the same kind of soil. Following up the creek for a short distance, we finally came to a large bend. The general direction of the creek is from east to west, bearing slightly to the northwest. At this place it made a bend to the southwest, then west, and back northwest, making a flat bottom land. At this place also a small creek flowed in from the north. It has been stopped by trash and soil, causing it to overflow and making a fan-shaped delta. In this bend we were searching, and finally my son found a large healthy plant of *B. obliquum*, the largest I have ever seen. It was nearly ten inches across. It had no fertile spike, just the sterile frond. We searched for more, but found none.

In about two weeks I came again to the place and searched the ground more thoroughly. Finally, in a bunch of hazel bushes, among the leaves, I saw the top of a small *B. obliquum*. Looking closer, I found five more lifting their fronds up between the dead leaves. All were small three-lobed plants; one, which was very

small with three small ear-like lobes, was perhaps only a few months old. I hunted round and round for more, but found none. Those six were in a plot six feet square and two hundred feet from the larger plant. Then I began to scrape the leaves away and hunt toward the large plant. Finally I scratched and searched all around the large plant, but found no more near it.

Here was a queer happening. Six small Botrychiums in close proximity two hundred feet from the supposed parent and none between them and it. I stopped a moment to study. Finally I concluded those six small ones were not from spores cast by the large plant. The parent plant was up the small creek to the north. The large plant was 100 ft. on the west side of the small creek and the six small plants were 100 ft. to the east of the creek. After reasoning out a plan I started up the small creek to find the parents. After going six or eight hundred feet, following the creek closely, I decided I had missed the place, as the creek narrowed down, leaving no bottom land. Turning about, I searched farther back from the creek in the hazel bush. I came to a clump of hazel and, examining among the leaves, I noticed a small plant, then another, then two or three other larger ones. I counted thirteen inside a plot six feet square. Some were large enough to produce spores, but not a fertile frond did I find. Going farther down, I came across seventeen more, all inside a plot four feet square; these also were small plants. Some grew so close together that I dug up a clump of dirt four inches square with five small Botrychiums growing in it, which I brought home for my fern garden. Lower down I found two larger plants a short distance from each other. These two were plenty large enough to produce spores, but neither had fertile spikes.

The next day I came back again and in hunting I

found nine more, making forty-eight all together that I had found. Three more were in the plot where I found thirteen the day before and one was found fifty feet away. Four were found farther down near one of the large ones, and one near the plot where six had been found at first. The colony was inside a triangle 200 by 500 by 600 ft. Most of the plants were in four plots. The upper plot contained sixteen, the next seventeen; lower down was one of five and below this one with seven. Three of the large plants were growing alone.

Why should all these plants be without fruiting spikes? At least eight were large enough. About one third of the colony appeared to have come from spores this year. About a third looked to be about a year old, and the remainder were perhaps two years old or older. The only reason I can give for no fertile spikes being produced this year is, our spring and early summer were very dry. Our fall was very wet; we had more rain in September than we have had for years in that month. As the early part of the year was dry when the plants were starting to grow, the fertile frond no doubt withered away or was not produced at all on account of insufficient moisture. When the rains did begin, there was plenty of moisture to start spores lying in the leaf-mold, and that was perhaps the reason so many small plants were found.

I shall keep these two colonies of Botrychiums under close observation this coming season. As there was no *B. dissectum* among the *B. obliquum*, nor did I find any *B. obliquum* in the colony of *B. dissectum*, I shall watch with interest to see if any appear.

In my other paper I reported finding *B. obliquum* throughout the state of Alabama. Since writing that paper I have compared my specimens with those from the Society's herbarium and I find that all the plants I

collected in southern Alabama, also those I found in Hale County, which is just south of the center of the state, are of the var. *tenuifolium*. But all the plants I found in the northern part—and that was where I found the larger number I collected in the state—are true *B. obliquum* Muhl.

BENTONSPORT, IOWA.

Generic Names Commonly Applied to our Shield-Ferns

KENNETH K. MACKENZIE

Very few groups of plants have had more generic names commonly applied to them than have our shield-ferns. In different botanical works and in different countries they appear under diverse names, and in looking up the literature bearing on them, one has to be familiar with all of these generic names. I, however, am not acquainted with any paper in which all of these names in common use are given, together with reasons for their use. Accordingly, I have prepared this paper. The names considered are the following:

1. *Thelypteris* Schmidel Icon. Pl. Ed. **2:** 45, pls. 11, 13. 1762. This edition of Schmidel's excellent colored figures of plants contains illustrations of fifty plants, each with several pages of text. At the head of each description, the name of each plant is given, such as Rubus, Vitis, Thelypteris. I do not believe that these names are to be regarded as generic names. They seem to me to be simply specific or vernacular Latin names applied to the particular plants illustrated, and are strictly equivalent to such English names as Blackberry, Grape, Marsh Fern.

It must always be remembered that specific names may be either polynomial, binomial or uninomial and

that specific names of all these three kinds were in common use by the older writers. Had Schmidel, for example, headed his long article with the name "Acrostichum fronde pinnata, pinnis pinnatifidis integerrimis Linn. Sp. Pl. 1071 No. 21," no one would ever have contended for a minute that under this name Schmidel was giving a generic description. Instead of doing the above, Schmidel used the uninominal name "Thelypteris" and as a synonym of Thelypteris gave the above Linnaean polynominal immediately below along with five other similar polynomial specific names, the first of which was "Thelypteris palustris non ramosa Rupp." He did not directly quote the Linnaean binomial name *Acrostichum Thelypteris*, but that is given by Linnaeus at the place cited by Schmidel. On the next page Schmidel devoted three quarters of a page to the synonymy of the plant under discussion by him and all of this is specific synonomy. Following this he gave a most detailed two-page description all of which is purely a specific description. There is no generic description at all.

Very similar uninomial names by Ehrhart are specifically warned against by the Vienna Code (Art. 54 par. 3), as follows: "Ehrhart (Phytophylacium (1780) and Beiträg. IV. 145–150) made use of a uninomial nomenclature for species known at that time under binary names (Phaeocephalum, Leptostachys, etc.). *These names, which resemble generic names, must not be confused with such, and are to be rejected.*" Italics mine. See also an article by Dr. Barnhart on these names (Rhodora **22:** 180).

Mr. Weatherby believes, as indicated in letters to me, that because Schmidel in the preface to his work, after telling how much trouble he had had with his synonymy, and giving as an illustration Thelypteris palustris non

ramosa Ruppius, spoke of this as "a true species of Thelypteris" and as differing from another species "by the space of a whole order or certainly of a genus," we should not follow what Schmidel actually did when he came to the body of his work, but should treat his publication as a generic one.

The fact is that Schmidel was not concerning himself with any questions of differences between a genus and a species. He was simply applying a plant name as such and in so doing did not keep at all to the distinction we make between genera and species. If anyone will study that very fine six volume work, the Herbarium Blackwellianum, he will find a most extraordinary amount of this old synonomy given. He will find very numerous references to the older authors, and will quickly see how uninomial names were used indiscriminately for genera, for species, and as purely vernacular names.

The question involved is an important one because there were many other names similarly used by Schmidel and other authors of this period, and if those names so used are to be treated as generic names much study will have to be given to the works in which they appeared.

In view of the above, one cannot therefore follow Nieuwland (Am. Midl. Nat. **1:** 226. 1910) in taking up *Thelypteris* as the proper name for this genus, and one must dissent from Weatherby's similar course (Rhodora **21:** 174. 1919.)

2. *Dryopteris* Adans. Fam. Pl. **2:** 20, 551. 1763. It would be hard, I believe, to find any name concerning which more incorrect statements have been made than about this name. For some reason, it seems to have excited the most intense animosity in certain directions, and the result has been some extraordinary statements concerning it. Following the plan adopted throughout

his work, its author, in a sort of a table, gave certain characteristics of a number of fern genera. In order to save printing and space, he constantly employed "id." where he wished to repeat what appeared immediately preceding. Substituting for the word "id." where it occurs in the description of *Dryopteris* what immediately precedes it, we find Adanson's description of *Dryopteris* reads as follows: "Paquets de fleurs ronds, disposés sur 2 rangs sous chaque division des feuilles. Enveloppe en parasol. Globules environnés d'un anneau élastique." And on page 551 (where the name is spelled *Druopteris*) we find the male-fern given as belonging to the genus.

The only part of the above description by Adanson which was different in all respects from his description of other genera is the phrase "en parasol." This only did he print out in full, and the rest of his description consists of a series of the word "id.", and as above stated one has to refer to the lines immediately preceding to see what these mean. By this arrangement Adanson not only gave a good description in a very short space, but he brought out what he regarded as the essential differences between the genus *Dryopteris* and other genera recognized by him, so that anyone using his work could tell at a glance what these differences were. He had the courage of his views and did not hide what he believed were the essential differences in a mass of verbiage. It seems to me that he should be praised for this and not blamed.

Surely the description above quoted is sufficiently full to comply with any and all rules of nomenclature. It is in fact a good description. The statement by Mr. Weatherby (Rhodora **21:** 174) that "as has several times been pointed out, its publication was inadequate under the International Rules" is based on a statement

made by Prof. Fernald (Rhodora **21:** 10) that "the only word of diagnosis" is "enparasol." As shown above, this statement is entirely erroneous. Nor can I follow the further statement that "enparasol" "describes the peltate indusium of Polystichum, not the reniform indusium of Filix mas." (Fernald l. c.). What Adanson undoubtedly intended was to differentiate the more or less rounded indusia of this genus from the elongate valve-like indusia of other genera described by him at the same time. So understood, the word "enparasol" applies to all species of *Dryopteris* and *Polystichum* having an indusium. As a matter of fact, Fernald's statement is probably based on a previous article by Davenport (Rhodora **4:** 163. 1902) where the same strained meaning is given to the description of Adanson. It is suggested that the etymology of the word parasol might be consulted with advantage.

There can be then no doubt that *Dryopteris* is an excellent name and that the genus was fully and adequately described by Adanson.

3. *Aetopteron* Ehrh. Beitr. **4:** 148. 1789. This is not a generic name but a uninomial specific name, a "nomen usuale" proposed for *Polypodium aculeatum* L. without description. (See Barnhart in Rhodora **22:** 180 (1920); Vienna Code Art. 54.)

4. *Polystichum* Roth, Römer's Arch. Bot. **2**[1]**:** 106. 1799; Tent. Fl. Germ. **3:** 69–93. 1800 (preface dated Sept. 14, 1798). Roth's work on ferns was very able. His treatment of his genus *Polystichum* is very lengthy and full. He said there were two groups, the first with "involucro peltato"; the second with "involucro reniformi." The species given by him in the first group in order are (1) *Lonchitis;* (2) *Phegopteris;* (3) *montanum;* (4) *Thelypteris;* (5) *aculeatum;* (6) *Dryo-*

pteris; and the species given by him in the second group in order are (7) *Filixmas;* (8) *cristatum;* (9) *strigosum;* (10) *multiflorum* and (11) *spinosum;* and a species doubtfully assigned to the genus, viz: (12) *Marantae.* It will be noticed that only two out of the eleven species belong to the genus *Polystichum* as treated at the present time in our current botanies. Seven species undoubtedly belong to the genus *Dryopteris* and if the genus *Phegopteris* is treated as a section of *Dryopteris,* this would mean that nine of Roth's species belong to *Dryopteris.* I cannot find anything in Roth's work which suggests to me that he regarded either of his two groups as more typical of his genus than the other. He does not seem to have emphasized either group. Under the circumstances, taking the first species of the first group (*P. Lonchitis*) as the type of the genus seems entirely justified, and the name can properly be used as it is in our current manuals.

Christensen (Index Filicum XXIV) reaches the same result by treating *Polypodium aculeatum* L. as the type of the genus, but I do not believe that his selection of a type is the proper one. I do not see how those who profess to follow the Vienna Code, which requires that on breaking up a genus where no typical section or division is designated, the generic name must be used for the group that has much the greater number of species, can use the name except as a synonym of *Dryopteris.* As a matter of fact, this is what has been done by some European botanists. (See Denise in that very helpful work Coste Flore de la France **3:** 686–8. 1906.)

5. *Aspidium* Swartz Schrad. Journ. 1800[2]: 29. 1801; Swartz Synop. Filicum 42–61. 1806. The original description of this genus reads "Char. *Capsulae* in puncta subrotunda sparsa digestae, *Indusiis* umbilicatis l. dimidiatis tectae" (see also p. 4). Some 72 species are

given, the arrangement commencing with species with "fronde simplici"; then "fronde trifoliata"; then "fronde pinnata"; then "fronde 2–3-pinnata." The two first sections have two and one species respectively, and the remaining species are about equally divided between the two other sections. The first species given is *Aspidium articulatum* (Plum. fil. pl. 136), a species with simple fronds. The first European species is *Aspidium Lonchitis* based on *Polypodium Lonchitis* L., plates being cited (Fl. Dan. 497; Jacq. Coll. 3. t 22. f. 1). It is the second species in the third section. The first European species in the fourth section (the second species in that section) is *Aspidium cristatum*, based on *Polypodium cristatum* L. The species are from many parts of the world and represent a number of genera—*Dryopteris*, *Polystichum*, *Cystopteris*, *Athyrium* and others. The name comes from the round shield-like indusium. There is nothing emphasizing any particular species.

I would say that *Aspidium Lonchitis* is properly the type of this genus and that French botanists, like Denise (Coste Flore de la France **3:** 684–6. 1906) who use the name for that species and its relatives are correct in so doing.

Christensen (Index Filicum XXII) treats the third species given, the only one in the second group, as the type of the genus. This is *Polypodium trifoliatum* L.; the first Linnaean species cited. It does not seem to me that this is a good selection.

6. *Nephrodium* Richard in Marthe, Cat. Jard. Méd. Paris 120. 1801; Michaux Fl. Bor. Am. **2:** 266. 1803.

This name first appears in Marthe's Catalogue without discription as follows:

"Nephrodium Filix mas. Néphrode Fougère mâle." (See Davenport Rhodora **4:** 158. 1902.)

It was fully published in 1803 when Richard produced Flora Boreali Americana under the name of Michaux. The generic description there reads:

"NEPHRODIUM. *Hort. med. paris. Cat.*
Νεφρος Ειδος: *fructificatio punctis subreniformibus.*

"POLYPODIUM *L.*

"FRUCTIF. Puncta in disco frondis sparsa seu seriata; primum obtecta membranula reniformi aut lunata, hinc (servato nexu laterali) dehiscente."

The species given in order are (1) *acrostichoides;* (2) *thelypterioides;* (3) *marginale;* (4) *punctilobulum;* (5) *bulbiferum;* (6) *Filix foemina;* (7) *asplenioides;* (8) *cristatum;* (9) *tenue;* (10) *rufidulum;* (11) *lanosum;* (12) ***Dryopteris.***

It will be noted that there were included species now referred to *Polystichum, Dryopteris, Cystopteris, Athyrium, Cheilanthes* and *Phegopteris.*

It seems to me that under the circumstances given *Nephrodium Filix-mas* is to be regarded as the type of this genus. Mr. Davenport went into this matter very fully (Rhodora **2:** 158–166. 1902) and reached this conclusion.

7. *Lastraea* Bory. Dict. Class. d'hist. nat. **6:** 588 (indicated only). 1824; **9:** 232. 1826.

The species given by Bory in 1826 were (1) *oreopteris;* (2) *Thelypteris;* (3) *Phegopteris;* (4) *Dryopteris;* (5) *calcarea;* (6) *Poiteana;* (7) *Balbisiana* (Ind. occ.). The first five are European and the last are non-European. This name has been much in use in England because it was taken up by Moore, one of the leading fern students there. As will be noted, as originally proposed, it was intended to cover species without an indusium or with a very evanescent indusium.

In fact, it was very largely the same as *Polypodium* Sect. *Phegopteris* Presl, Tent. 179. 1836.

Moore, Ferns of Great Britain and Ireland (paging not numbered), under *Lastraea Filix-mas* incorrectly treats that species as the type of this genus. Newman more correctly treats the first species named, viz: *Lastraea oreopteris* as the type, although it is to be noted that Moore claims that "*Lastrea oreopteris* does, in fact, much less accord with Bory's character than do the three Polypodies he associated with it." It seems to me that Newman's views should be followed and that *Lastraea* should be treated as synonymous with *Dryopteris*. The alternative would be to follow Moore's intimation and to treat *Lastraea Phegopteris* as the type and make this genus a synonym of the genus *Phegopteris* (Presl) Fée (which it antedates).

In conclusion, I would say that under all codes, the name *Dryopteris* is the proper one for the genus. The name *Polystichum* is properly in use by those who use the American Code, but as far as I can see, it is not being properly used by those who profess to follow the Vienna Code. It seems to me that they should treat it as a synonym of *Dryopteris*, and in its place use *Aspidium*.

MAPLEWOOD, NEW JERSEY.

Notes on the Pteridophyta of Oklahoma

FRANK C. GREENE

So far as known, no list of the pteridophytes of Oklahoma has been attempted, and judging by the writer's experience, considerable collecting must be done before a list approaching completeness can be compiled. Two lists of the Pteridophyta of Oklahoma Territory were published before statehood, the first by E. E. Bogue,

"An annotated catalog of the ferns and flowering plants of Oklahoma," Bull. No. 45, Oklahoma Agricultural Experiment Station, March, 1900, and the second by A. H. Van Vleet, "Plants of Oklahoma," in the Second Biennial Report, Department of Geology and Natural History, Territory of Oklahoma, 1902. Both of these are incomplete.

The fern flora of the central part of the state is fairly well known and that of the Ozark region in the northeastern part of the state can be estimated from the surrounding area. Practically nothing is known of the Ouachita Mountain region in the southeastern part of the state.

The Arbuckle and Wichita Mountains in the southcentral and southwestern parts, respectively, are worthy of a detailed examination, and the semi-mountainous area of Cimarron County at the western extremity of the Oklahoma "Panhandle" is due to furnish a long list when carefully explored.

All the species listed below, with one exception, were collected by the writer, and those of questionable identity or which seemed to be out of range, were identified by Dr. Maxon and specimens deposited in the National Herbarium. Mrs. Margaret M. Nice, of Norman, Okla., has added one species and many additional localities, also based on identification largely by Dr. Máxon.

Ophioglossum Engelmanni Prantl. Generally distributed over the state, both in forested and prairie regions. In many stations it is extremely abundant.

Botrychium Virginianum L. Abundant in the Ozark region in wooded valleys and on wooded hillsides. Two plants found near Tulsa.

Osmunda regalis L. Found on moist sandstone cliffs in the Osage Nation.

Polypodium polypodioides (L.) Watt. Generally distributed in the eastern and southern parts of the state. Found on the faces and tops of chert and sandstone cliffs.

Notholaena sinuata (Swz.) Kaulf. Abundant on exposed sandstone cliffs on Falls Creek in the Arbuckle Mountains. This plant is a typical southwestern and Mexican species and almost certainly has not been known north of Texas previously.

N. Standleyi Maxon. Found on granite on Headquarters Mountain at the western end of the Wichitas and on sandstone at the Jones Ranch just across the line in Baca County, Colorado, and just to the south in Cimarron County, Oklahoma (Mrs. Nice).

N. dealbata (Pursh) Kunze. Generally distributed from Grand River on the east through the northern central and southern parts of the state on limestone cliffs.

Adiantum capillus-veneris L. Found in the Ozarks, the central and southern parts of the state on moist cliffs.

A. pedatum L. Found in the Ozark region. Reported by Mrs. Nice in McCurtain County.

Pteridium aquilinum (L.) Kuhn. Found only in the Ozark region.

Cheilanthes Alabamensis (Buckl.) Kunze. Found on chert in the Ozark region. Recently collected in the Arbuckles by Miss Constance Nice.

C. Eatoni Baker. Found in exposed situations in the Wichitas, near Cleveland, Pawnee County, and in Cimarron County.

C. Feei Moore. Found all over the state on limestone or calcareous sandstone.

C. horridula Maxon. On limestone on Oil Creek and near Turner's Falls in the Arbuckles. The previously

known range includes Mexico, Arizona, New Mexico and southern Texas as mentioned in the critical notes by Dr. Maxon on this species published in the AMERICAN FERN JOURNAL, Vol. 8, pp. 93, 94, 1918.

C. lanosa (Michx.) Watt. Generally distributed over the eastern part of the state on sandstone. Comanche County (Mrs. Nice).

C. tomentosa Link. Central and western parts of the state on sandstone.

C. Wootoni Maxon. Found on sandstone at the Jones Ranch just over the state line in Baca County, Colo. Also found in Cimarron County, Okla., and in the Wichitas by Mrs. Nice.

Pellaea atropurpurea (L.) Link. Generally distributed over the state.

P. glabella Mett. Found in the Ozark region and in Kay, Pawnee and Osage counties, on dry limestone cliffs.

P. Wrightiana Hook. Found at the Hallock Ranch in Cimarron County on sandstone.

Asplenium resiliens Kunze. Generally distributed over the eastern, central and southern parts of the state on limestone in shaded places.

A. platyneuron (L.) Oakes. Occurs all over the state.

A. septentrionale (L.) Hoffm. Grows in the bedding planes of sandstone in Baca County, Colo., near old Regnier P. O., just across the line from Oklahoma (Jones Ranch locality). Later found in Cimarron County by Miss Constance Nice.

A. trichomanes L. Northeastern and northcentral parts of the state on shaded sandstone cliffs. Also found by Mrs. Nice in the Arbuckles and Wichitas.

Camptosorus rhizophyllus (L.) Link. Northeastern part of the state on shaded limestone and sandstone cliffs.

Dryopteris hexagonoptera (Michx.) C. Chr. Found only in the Ozark region.

D. marginalis (L.) Gray. Northeastern part of the state on sandstone. Also found by Mrs. Nice near Tecumseh in the central part and in the Wichitas.

D. filix-mas (L.) Schott. Found by Mrs. Nice in Fern Hollow, 6 miles east of Kenton, Cimarron County.

Polystichum acrostichoides (Michx.) Schott. Found in one place in Osage County and abundant in the Ozark region.

Filix bulbifera (L.) Underw. On moist limestone cliffs in the Ozark region.

F. fragilis (L.) Underw. Central and northeastern parts of the state.

Onoclea sensibilis L. Found on moist sandstone in one locality in the Osage Nation. Found by Mrs. Nice in McCurtain County in the southeastern part of the state.

Woodsia oregana D. C. Eaton. On sandstone at the Jones Ranch, in Baca County, Colo., just across the state line.

W. obtusa (Spreng.) Torr. Probably the most widely distributed and certainly the most abundant species in the state.

Marsilia tenuifolia Engelm. In "buffalo wallows" on open prairies in north-central part of state.

Equisetum laevigatum A. B. Central and northeastern parts of state.

Selaginella rupestris (L.) Spring. Northeastern part of the state.

S. Sheldoni Maxon. Found in and near the Wichita Mountains on granite and sandstone. The type was collected in this region on Quanah Mountain by C. S. Sheldon.

S. Underwoodii Hieron. On sandstone on the Jones Ranch in Baca County, Colo., just across the state line.

TULSA, OKLA.

Ferns of the Vicinity of Irvine, Kentucky

WILLIAM ARTHUR ANDERSON, JR., AND ANN RIDDELL ANDERSON

Irvine, the county seat of Estill County, Kentucky, is located in the foothills of the Kentucky mountains, about forty six miles southeast of Lexington. The Kentucky river flows by the town, at this point passing through a rather wide valley. A few miles downstream it enters the canyon by which it traverses the Bluegrass plateau.

The foothills or Knobs, in which Irvine is situated, are very interesting from a geological and ecological standpoint. The rocks are of the Silurian, Devonian and Mississippian systems. The Knobs, or small mountains are frequently cone shaped in outline, and rise up five or six hundred feet from narrow creek valleys. Their steep slopes are of shale and most of them are capped with limestone, a much harder rock, which often appears as a cliff encircling the summit. Iron and coal are found near Irvine, though not in commercial quantities. There is an oil pool which is one of the richest in the state. Mineral springs abound, and one group of them, the Estill Springs, were for a long time a popular watering place.[1]

Most of the valleys are under cultivation. The steep slopes of shale are sterile and not suited to farming, so there is much land covered with forest, though most of the heavier timber has been taken out. Upon climbing any of the mountains of this region one passes from the deciduous woodland of the valleys into a belt of scrub pine (*Pinus virginiana*), black jack (*Quercus mariland-*

[1] For a detailed discussion of the Knobs region see Burroughs' The Geography of the Kentucky Knobs, The Kentucky Geological Survey. 1926.

ica), and frequently various ericads. In this association are found the mountain laurel, blueberries, the pink lady slipper, and the mountain pansy or bird's foot violet. Up near the tops of the mountains, on and near the limestone, are more deciduous forests of oak, chestnut, tulip trees and the like.

Such a region as this, with its variety of soil and its many woodlands, is especially interesting to fern lovers. Following is a list of ferns representing a collection over a period of five years, from 1922 to the present. These collections were all made within five or six miles of Irvine, for though the highway out to the Bluegrass is excellent, the country roads are rough and at times impassable and most trips were made on foot. More extended trips into the hills would doubtless be of interest.

This collection was checked against the ferns in the herbarium of Dr. Frank T. McFarland, of the University of Kentucky, also the herbaria of the University of Kentucky and the Kentucky Agricultural Experiment Station. It is found that only about thirty six species of ferns have been reported for the whole state of Kentucky. Twenty two species and one variety are here reported for the vicinity of Irvine alone.

In the appended list, the habitat of each species and the localities from which specimens were actually taken are given. The nomenclature is that of Gray's Manual, ed. 7.

1. *Adiantum pedatum.* Maidenhair fern. Moist ravines (common). Henry Mountain; Rice Station.

2. *Asplenium platyneuron.* Open woods and ledges (common). Henry Mountain; Grindstone Hollow.

3. *Asplenium parvulum.* Crevices of cliffs. Henry Mountain.

4. *Asplenium angustifolium.* Moist ravines. Rice Station; Henry Mountain.

5. *Asplenium Filix-femina.* Lady fern. Moist places; creek banks. Rice Station.

6. *Aspidium noveboracense.* Creek banks. Rice Station; Sand Hill.

7. *Aspidium marginale.* Marginal shield fern. Rich woodlands; ravines. Grindstone Hollow; [2]Henry Mountain.

8. *Aspidium Goldianum.* Moist woodlands. [2]Henry Mountain.

9. *Botrychium virginianum.* Rattlesnake fern. Rich woodlands. Henry Mountain; Grindstone Hollow.

10. *Camptosorus rhizophyllus.* Walking fern. Rock surfaces. Henry Mountain; Iron Spring.

11. *Cystopteris bulbifera.* Bladder fern. Base of cliffs on north side of mountain. Henry Mountain.

12. *Cystopteris fragilis.* Damp crevices of rock. Henry Mountain.

13. *Dicksonia punctilobula.* Hay-scented fern. Open woods. Rice Station.

14. *Onoclea sensibilis.* Sensitive fern. Low, moist woods. Near Iron Spring.

15. *Osmunda regalis.* Royal fern. Wet woods. Sand Hill.

16. *Osmunda Claytoniana.* Interrupted fern. [2]Henry Mountain.

17. *Osmunda cinnamomea.* Cinnamon fern. Wet woods. Sand Hill; Henry Mountain.

18. *Osmunda cinnamomea,* var. *frondosa.* [2]Henry Mountain.

19. *Polystichum acrostichoides.* Christmas fern. Banks (very common). Grindstone Hollow.

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[2] Collected from gardens in Irvine, where they had been transplanted by Mr. Henry, an old mountaineer. All were brought from Henry Mountain, but the authors were unable to find the exact localities.

20. *Pteris aquilina.* Bracken. Dry, open woods. Rice Station; Grindstone Hollow.

21. *Pellaea atropurpurea.* Purple cliff brake. Dry crevices of cliffs. Henry Mountain.

22. *Phegopteris hexagonoptera.* Wooded banks and ravines. White Oak Creek; Rice Station; Henry Mountain.

23. *Woodsia obtusa.* Wet woods. Rice Station.

LEXINGTON, KENTUCKY.

Recent Fern Literature

Professor Mary M. Steagall, of the Southern Illinois Teacher's College at Carbondale, has made an interesting study of the ecology of the ferns of that region.[1] Twenty-six species were available for study, fourteen of them being evergreen. The smallness of this number for the area of nearly 500 square miles with a wide variety of habitat is evidently due to climatic limitations, for the Summer temperature goes as high as 104°, the winter as low as −24°, while heavy rainfall in Spring is followed by two months of extreme drought. Cliffs and ledges of both sandstone and limestone are present, furnishing opportunity for studying the behavior of species in soils of contrasted reaction.

The three species which grow only on limestone rock are the most xerophytic. *Cheilanthes feei* adapts itself to the dryness by rolling up its pinnules into little pubescent hemispheres; *Pellaea atropurpurea* turns its fronds edgewise to the sun, making scarcely a shadow on the rock; *Asplenium parvulum* slants its pinnae like the half-open slats of a window shutter, and again the sunlight streams through. The optimum reaction for all of these

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[1] Steagall, Mary Minerva. Some Illinois Ozark ferns in relation to soil acidity. Trans. Ill. State Acad. Sci., **19**: 113–137. 1926.

is low subalkaline, specific alkalinity 10. Three others grow only on sandstone, and are regarded as showing less xerophytic characters. *Asplenium pinnatifidum* avoids extreme dessication by growing on the shady side of cliffs, and its optimum reaction is high mediacid, specific acidity 300; *Polypodium vulgare* forms mats of root-stocks which catch soil and are sheltered by the dense mat of fronds, and prefers low mediacid soil, specific acidity 100; *Polypodium polypodioides* withstands drying out by folding and curling its fronds, and is able to grow 10 to 50 feet higher on the cliffs than its relative, in soil of high minimacid reaction, specific acidity 3.

Then there are two species which elsewhere seem to prefer calcareous rocks, but here in order to get sufficient moisture they resort to other situations: *Camptosorus rhizophyllus* grows on sandstone rocks where the reaction is chiefly high subacid, specific acidity 30, and *Cystopteris bulbifera* betakes itself to deep siliceous soil, essentially neutral in reaction, and is not found on rocks at all. On the other hand one swamp fern which elsewhere favors mediacid soil, *Osmunda cinnamomea*, here grows in a neutral limestone ravine. But a single individual is known, however, and while its rhizome shows that it has been there for years, it does not reproduce. The remaining species discussed show habitat and soil-reaction relations essentially similar to those reported for other regions.

The data obtained in this study are contrasted with those published for the same species in other regions, and in particular with the reaction-measurements by the reviewer,[2] and it is concluded that moisture conditions are more important than soil reaction in deciding where a given species will thrive. This may be true for some

[2] AM. FERN JOUR., 10: 15 and 11: 5, 1920 and 1921.

species, but the reviewer is not prepared to accept it for all. Surely *Polypodium polypodioides* is quite as effectively adapted to withstand drought as *Asplenium parvulum*, so that its failure to grow in the most xeric habitats (alkaline limestone ledges) implies an influence of reaction. Again, *Cystopteris bulbifera* manages to seek out circumneutral soils here, just as it does elsewhere, even though the bulk of the moist soils of the region are strongly acid. Finally, the fact that the *Osmunda cinnamomea* is not reproducing shows that its nutrition is abnormal, and since its moisture supply is presumably adequate, the reaction of the soil would appear to be affecting it markedly. The fact that certain generalizations can not be accepted without reservation does not detract from the value of the work as a whole, however, and Miss Steagall is to be congratulated on making an important contribution to ecological literature. The hope may be expressed that workers in other regions will be stimulated by it to supplement the mere lists of species, which are so frequently published, with notes on habitats and soils, for it is only by accumulating such data that we can solve the problems of why individual species grow only in certain places.

E. T. WHERRY.

NOTES ON ASPLENIUM TRUDELLI.—The bipinnatifid relative of *Asplenium pinnatifidum* previously regarded as a variant unworthy of nomenclatorial recognition, was described and assigned the name *Asplenium trudelli* by the writer two years ago.[1] The type locality was Cully, Lancaster County, Pennsylvania, and its occurrence was noted also at York Furnace, Pa., Harpers Ferry, W. Va., and Winston Co., Ala. Subsequently Mr. E. W. Graves[2]

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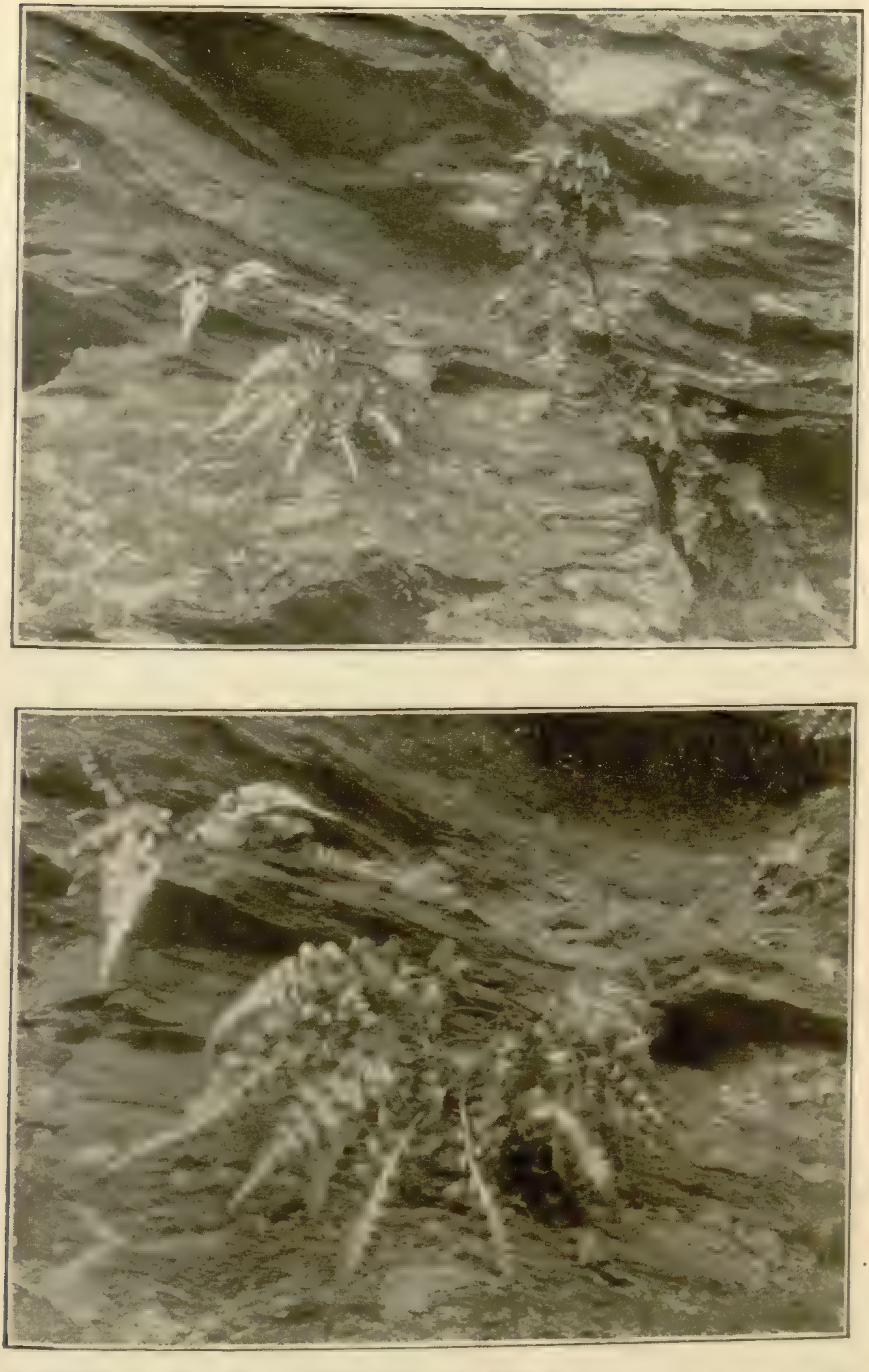
[1] AMER. FERN JOURN., **15**: 49–50, 1925.

[2] AMER. FERN JOURN., **16**: 48–51, 1926.

has called my attention to an oversight on my part: he had previously found the same plant at Long Island, Alabama, and sent specimens to the U. S. National Herbarium. My overlooking these, for which I wish to express my apology, was due to the fact that they are mingled with specimens of *A. pinnatifidum*, and the sheets were passed over as representing that species. It is also noteworthy that a living plant, placed in a mixture of acid peat and sand in a small flower pot, has thrived in the U. S. Department of Agriculture greenhouse for some years, and by now forms a dense clump with a hundred or more fronds.

On the occasion of the trip of the American Fern Society to the lower Susquehanna valley, July 3–5, 1927, search was made for this fern at the type locality and elsewhere, but it proved to have practically disappeared, only a single plant being found by Mr. Trudell, in the vicinity of Face Rock station. At the time of that trip Mr. Joseph Crawford, of Philadelphia, called attention to the occurrence of this species at Southside, York County, Pa., which was too remote to be included in the regular itinerary, but was visited subsequently by a few of the members. About a dozen plants proved to be growing on the mica-gneiss rocks there in low mediacid soil, and as no habitat photograph of it seems to be on record, a plate is published herewith showing two views taken on August 20, 1927. To the left of the clump of *A. trudelli* is a small plant of *A. pinnatifidum*, to the right a large colony of *A. montanum*, so that the contrasts between the three are made evident.

Recently the range has been extended over still another state by finding typical *A. trudelli*, along with its two relatives, in crevices of sandstone rocks in the gorge of the Cumberland River a short distance below Cumberland Falls, Kentucky, on September 10, 1927.



Asplenium trudelli, with its relatives A. pinnatifidum and A. montanum, on mica-gneiss at Southside, York County, Pennsylvania

Asplenium trudelli is usually included in collections with *A. pinnatifidum*, but is easy to distinguish in that several of its lower pairs of segments have definite stalk-like bases, whereas in *A. pinnatifidum*, even when most deeply cut, all the segments are essentially sessile. It is probable that examination of collections of ferns of this group with this point in view will bring to light additional localities of *A trudelli*, which should be placed on record so that the details of its distribution can be ascertained.—EDGAR T. WHERRY, *Washington, D. C.*

OPHIOGLOSSUM ENGELMANNI PRANTL IN OHIO.—*Ophioglossum Engelmanni*, an adder's tongue of distinctly southwestern range, is growing abundantly near Beaver Pond, in Adams County, Ohio. This fern has not previously been recorded from Ohio. The locality is at the western edge of the Allegheny Plateau, just within what is popularly known as the "hill country." In the three stations thus far discovered, the plants are on dry open, rather grassy slopes, in black very porous and pebbly dolomite soil.

The community of which the Ophioglossum is a part, is distinctly prairie-like, made up of prairie species and southeastern xerophytes. Such plants as *Andropogon scoparius*, *Boutelova curtipendula*, *Agave virginica*, *Lithospermum canescens*, *Senecio balsamitae* and *Blephilia ciliata*, are the associates of the Ophioglossum in the openings in which it is growing. The largest plants are to be found in the shelter of shrubs which are scattered about in the openings, but the species is by no means limited to these shaded spots.—E. LUCY BRAUN, *The University of Cincinnati.*

AMERICAN FERN SOCIETY

The field trip announced on pages 73–74, in No. 2 of the JOURNAL, was attended by about ten representatives from the American Fern Society, a like number from the Washington, D. C., Chapter of the Wild Flower Preservation Society, a few from the Torrey Botanical Club, and several visitors, bringing the total to forty-five. Saturday afternoon we gathered at the Riverview Hotel, Pequea, Lancaster County, Pennsylvania, which is beautifully situated on the east bank of the Susquehanna River. During the evening a brief session was held in the parlor of the hotel, Dr. Wherry describing, with the aid of a series of lantern slides, the ferns expected to be seen during the next two days. Mr. Joseph Crawford, of Philadelphia, then gave an interesting account of some of the trips to the region taken by a group of amateur botanists about twenty-five years ago, exhibiting a privately published book, cleverly illustrated by one of the participants, describing their experiences. The management of the hotel did everything they could to make us comfortable, and while our slumbers were somewhat disturbed by a few of the guests becoming intoxicated and rather boisterous, the group was ready to start off on the hike by 8.30 Sunday morning.

After a walk of two miles down the railroad track we reached Tucquan ravine and visited the famous locality of *Asplenium bradleyi*, but found this fern to be growing scarce, for on the cliff where ten years ago there were a hundred thriving plants, now barely a score of stunted ones could be found. On rocks at a lower altitude a colony of *A. montanum* was seen, and near the stream was a variety of *Cystopteris fragilis* with stoutish oblique rootstocks. On one large rock we were so fortunate as to find a good-sized colony of *Polypodium virginianum* f.

acuminatum, and on another a bit of *Camptosorus rhizophyllus*, barely managing to struggle along in this non-calcareous region. We then walked two miles further to Holtwood, and ate our lunch near a refreshment stand where the cold drinks and ice cream were much appreciated.

A short distance below Holtwood, in Cully ravine, we found a small colony of *Asplenium pinnatifidum*, but searched in vain for its relative, *A. trudelli*, which formerly grew there, although Mr. Trudell, while at a distance from the rest of the party, did succeed in finding a single plant of it, on a shaded cliff facing the river. A mile further along, at Face Rock Station, a crevice well up the cliff was seen to contain a peculiar-looking fern, which proved to be *Asplenium gravesii*. During the remaining two miles of the walk, a few additional plants of several of the species mentioned were found, but they were mostly stunted, and far less abundant than in previous years. In particular, the formerly fine colony of *A. gravesii* at Fite's Eddy proved to have disappeared entirely.

Many specimens of rare rock-ferns from the west side of the river being preserved in herbaria, it was planned to search that side the following day, and we were duly ferried across to the mouth of Otter Creek. While the wooded slopes of this creek are very beautiful, the trail up which we started soon disappeared, and we were forced to break our way through dense undergrowth, to scramble over rocks and fallen logs, and even to wade the stream three times. Although the distance to the nearest road, as measured on the accurate topographic map of the region—the McCall's Ferry Quadrangle, U. S. Geological Survey—was only one and a half miles, it seemed much longer, and some of the party turned back before the road was reached. Others followed the road

directly back to the boat-landing, while the most vigorous group crossed the divide to Sawmill Run and returned to the river along its ravine. *Asplenium pinnatifidum* and *A. montanum*, the latter in part of a peculiar slender form, were found in the course of the day, but here as on the other side of the river the rock ferns are evidently dying out. Apparently the climate is becoming drier, and this, together with the activities of man in repeatedly burning over the woods on adjacent hills is diminishing the amount of rain-water entering the crevices into which the ferns send their roots. Perhaps a future return to moister climatic conditions and the spread of the conservation idea may lead to their sometime becoming abundant again.

In all, thirty-four species and varieties of pteridophytes were seen.

It is hoped that trips of this sort may become an annual event, and invitations or suggestions as to a desirable place to visit in 1928 will be welcomed by the officers of the Society.

E. T. WHERRY.

Miss Annie Lorenz, a member of the Society since 1919, died at Hartford, Conn., June 11, 1927, in her forty-eighth year. She was born at Hartford, received her education in its schools, and had lived there all her life.

Her friends found Miss Lorenz a person unusually generous and affectionate; they will remember especially her ready serviceableness and her capacity for unaffected admiration of others. Though of slight physique, she possessed abounding energy, which found outlets, beyond the daily tasks which come to all of us, in music, gardening, active work for the church, the local musical, garden and horticultural societies, and, most of all, in botany.

Here her interest began especially early; she published her first botanical article at the age of sixteen. She was soon attracted to the *Hepaticae*: her work on this group continued until interrupted by her last illness. She became one of the best known amateur students of it in America. As a collector, her name is associated with the first New England record of many species. She described no new species, but she published careful studies of the structure and distribution of several, and she left a series of analytical drawings of all known to occur in New England. She was a member of various scientific organizations, recording secretary and treasurer of the Connecticut Botanical Society, and a Fellow of the American Association for the Advancement of Science. Her herbarium has been given by her father to Yale University.

New members:—

Anderson, W. A., Jr., Dept. of Botany, University of Tennessee, Knoxville, Tenn.
DuBois, Mrs. Louis J., 1394 Dean St., Brooklyn, N. Y.
Edson, Mrs. Josephine Z., 54 Fairview Ave., Rochester, N. Y.
Knapp, I., 20 8th St. N. E., Washington, D. C.
Monks, Mrs. Samuel M., 415 Prospect Ave., Hartford, Conn.
Potter, Miss Mabelle A., Rowe, Mass.
Vincent, Mrs. Myron H., Chilmark, Mass.
Wiley, Miss Farida A., Museum of Natural History, 77th St. and Columbus Ave., New York City.

Change of address:—

Demetrio, Rev. C. H., 1202 Azalia St., Memphis, Tenn.
Gannett, L. S., 87 Bedford St., New York City.
Nice, Mrs. Margaret M., 156 West Patterson Ave., Columbus, Ohio.

We owe the two illustrations in this number to the generosity of Mr. T. C. Palmer, Mr. Harry W. Trudell, and Dr. Edgar T. Wherry.

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ERRATA

Page 9, line 13, *for* (1925–1926) *read* (1923–1924).
" 24, " 2, *for* novo *read* nova.
" 105, " 19, for *Drypoteris* read *Dryopteris*.

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